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JOURNAL > SITE 0: CASTALIA, THE GAME OF ENDS AND MEANS | 2016

## Castalia, the Game of Ends and Means

### Glass Bead

The first issue of this journal, as well as *Glass Bead's* project at large, is directed towards rethinking art as a mode of rational thought. This engagement stems from a shared discontent with art's ongoing exclusion from reason, its positioning at the peripheries of knowledge, and its resulting political inconsequentiality. Our project departs from the assumption that any claim concerning the efficacy of art—its capacity, beyond either its representational function or its affectivity, to make changes in the way we think of the world and act on it—first demands a renewed understanding of reason itself.

It might come as a surprise to our readers that while it is an art journal, *Glass Bead* offers no critical reviews, no art-historical texts on specific works, artists, or exhibitions. None of the discursive practices that commonly surround and legitimize art are present in this journal. This absence is determined by *Glass Bead's* methodological decision not to address art from a pre-constituted identity, but rather to dynamically define its role through the exploration of other forms of reasoning (science, philosophy, politics, art, etc.).

While it foregrounds transits between disciplines, *Glass Bead* is not an interdisciplinary journal. In all its scholarly enthusiasm and benevolence, interdisciplinarity has now become some kind of empty motto. Starting from already constituted disciplinary identities, interdisciplinarity seeks connections whose broader impact on the forms of knowledge they connect are consequently silenced. As such, it appears unable to move beyond the implicit equivalence posited between the things it connects. By emphasizing direct, local connections, it proves particularly inadequate for addressing the hierarchal organization of the global structure of knowledge on which it rests.

Whereas interdisciplinarity seeks connections between fields of knowledge whose identity it ultimately leaves intact, our point of departure is rather that of a fully plastic and generic space of thought—a continuum of heterogeneous reasoning gestures, binding abstractions, and concrete determinations in a game of ends and means. From this point of view, a discipline can be understood as the particular and local instantiation of a group of conventionally constrained gestures operating within this continuum. It is only by recognizing the constitutive dynamics and differences between these diverse groups of gestures (i.e., the way each discipline unfolds its structural specificity through the generic space of thought) that artistic practices can hope to navigate this space and to have any traction on the global structure of reason.

It is this project of intrinsic navigation that *Glass Bead* wishes to take on.

### **A Renewed Abstraction**

Such an attempt is necessarily twofold. To rethink art's position within reason and its efficacy within the world demands an enlarged conception of what abstraction is and can do. This task first requires that we clearly distinguish abstraction as we intend it here from its common understanding within the context of art theory as a defined aesthetic (e.g., formalist abstraction, abstract expressionism). Neither a genre nor a specific domain of practice, abstraction must be understood as the generically constitutive activity through which humans come to define and transform themselves and the world.<sup>1</sup>

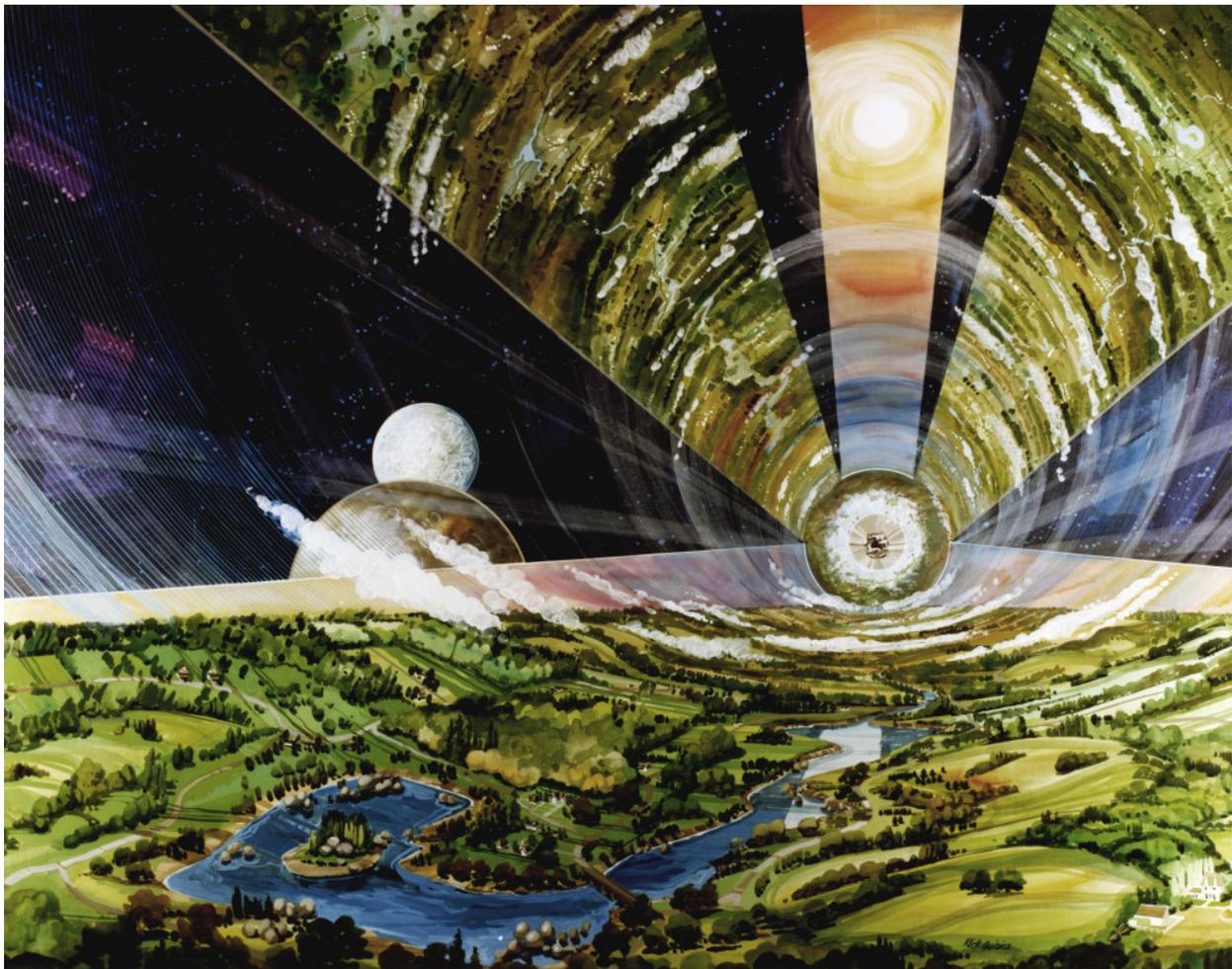
This widened approach to abstraction then calls for a renewed exploration of the function of art within the wider sphere of rational activity. Today, art's complex relation to abstraction can be schematically characterized by a general inclination towards a dynamics of retreat and seclusion. On a social and political level, there is a widespread tendency to oppose the systemic movements of the global economy by engaging with local particularities and seceding from these global movements of abstraction. In a society increasingly saturated with capitalistic vectors of abstraction, artistic and curatorial practices have attempted to safeguard aesthetics as an intuitively accessible common space surpassing all boundaries and overflowing all determinations. This immediacy also works on an epistemic level, where artistic production is seen as an alternative to the disembodied objectivities and overarching universals that modernity is criticized for having produced. Such a stand promotes a conception of art which, by way of a direct sensible relation to forms and materials, promises to rebind our knowledge with the alleged spontaneity of experience.

What these contemporary threads have in common is the idea that we can avoid the labor of abstraction by intuitively accessing the indeterminate expressive potential of the artwork. They are based on the shared belief that art, in its contemporary form and self-proclaimed epistemological and social immunity, can somehow be the guarantor of liberation from abstraction. Doing so, these threads implicitly promote a conception of freedom as that which is only achievable through the paradoxical coupling of flight and refuge. On the contrary, *Glass Bead's* contention is that, in regards to abstraction, there can be no escape, no respite, no sanctuary<sup>2</sup>. No spontaneous knowledge can be reclaimed nor immediate social order be retrieved. To affirm the contrary is to fall prey to the yearning for an irreducible real, the inexhaustible search and delayed promise of a lost kernel of freedom. Obsessed with its own agency, contemporary art tends to embrace this myth, therefore misapprehending the very space of its operations and further intensifying its epistemic and political inefficacy.

The distinction between the abstract and concrete can neither be posed as a rigid separation nor as a fluid mixture. On the contrary, the dialectical interpenetration of the terms requires an ongoing process of elaboration, redefinition, and exploration of the ways in which they are co-articulated. Making a move on the concrete ground always presupposes simultaneously stepping on the abstract plane that enables this movement. A simple act such as aiming at a destination and moving towards it implies both the physical trajectory of a body through space and the mental unfolding of a "line without thickness,"<sup>3</sup> without any correspondence whatsoever with the materiality of its terrain. Although it lies outside of the world and no sensible access to it is possible, this abstract line serves as a guide for the spatial organization of behavior. Any level of rational engagement with the world, being either physical, social, or conceptual entails a capacity for making complex mediations binding the concrete and the abstract. This capacity is inferential: it proceeds by and through reason<sup>4</sup>. Just as there is no navigation through a territory which is not to some degree correlated to a map, there can be no social organization or knowledge of the world without this dynamic entanglement. Likewise, just as any form of knowledge requires an articulation between the particular and the general, the construction of a common political horizon cannot be reduced to the immediacy of interpersonal relations. It necessarily involves the constitution of an abstract community: a movement of oscillation between the specificity of individual links and the global coherence of their mode of connexity.

The space opened by the dynamical binding of the abstract and the concrete is therefore an inferential space. It is a space modulated by the very gestures which enable it and constitute its fiber. All human activity to some degree or another pertains to this space. No one, including artists, can claim secession from such a space. Art, like any other practice, is embedded in this fabric of gestures. This is why any ambition to consider the role that art can play today, either in social or in epistemic realms, must first unfold as an operation on the very structure of the space of reasoning gestures.

Questions about the efficacy of art thus become spatial questions: How can we operate transformations on a space in which we are immersed? How can art participate in these transformations after having contested its exceptional position? How can these transformations be enacted without calling to any meta-gesture?



View of an O'Neill Cylinder, model for long term space settlement (Rick Guidice, 1967, Nasa Ames Research Center)

## The Space of the Game

To explore these questions requires first locating the institution of art and its historical constitution within this space. This localization entails, on the one hand, regionalizing art as a local modality of the wider, generic space of thought and, on the other hand, affirming art as a practice of abstraction and navigation between increasingly specialized yet overlapping domains of thought.

Historically understood, the constitution of the contemporary space of art can be read as a series of determinate negations that both transformed its ontology and instituted powerful forms of social critique. However this trajectory has also bound itself to a process of self-inflicted confinement and institutionalized myopia. Throughout modernist art theory, aesthetics can be said to have produced a constant mirroring between the “figure” of the modern subject and the “background” provided by a unified concept of nature.<sup>5</sup> As such, the space of art, from its modern inception as aesthetics, can be understood as both a negation and a reaction to the manifold scales of abstraction that modernity introduced in the world: the increasing scientific objectification of nature by Enlightenment rationality, the technological externalization of experience brought about by mechanical reproduction, the division of labor and the fragmentation of social life provoked by the advancing front of capitalist modernization. Operating at the margins of this rationalization of experience, and at the borders of the technological and social engineering of the modern psyche, aesthetics instilled forms of perceptual synthesis in the chains of mediation that modernity produced between the subject and the world.<sup>6</sup> Doing so, it occupied a paradoxically central and extra-territorial place in the topos of modern rationality: from the Romantic sublime to modernism’s transgressive ethos, art has been considered in excess and in exception to these rational operations, conceived as the reflexive tool for the production of openings outside rationality and conceptual production.

This conception of aesthetics as a bastion of immediacy standing up to the rationalization of experience has led art, in its most symptomatic contemporary form, to picture itself as a space of production of affects intractable to scientific thought, and receding into the ineffable. Contemporary art generally carries this critical project by foregrounding an endless play of indeterminate signification that consigns the function of the artwork to the generation of a meaning safeguarded from its evacuation by rational explanation. It puts forward an understanding of creativity and freedom as that which can only be achieved by escaping a rationality it pictures as reductionistic,

‘scientific,’ and suffused with the unconscious forces of class and libido. Doing so, it paradoxically projects the different scales of abstraction inherent to rationality into the background, as an implicit condition with which it becomes impossible to engage. Contemporary art, on the one hand, tends to counter its instrumental or functional reduction to means by foregrounding the unpredictability of its materials, its openness to different outcomes, and its multi-perspectival social inclusiveness—all of which is condensed in the institutionalized formula known as relational aesthetics. On the other hand, it opposes any reduction to ends by affirming indeterminate play, affective uncertainty, and semantic ambiguity. In constructing an image of freedom based on the irreducibility of creative expression to both ends and means, it tends to lose the capacity for engaging in the revisionary-constructive elaboration of freedom. In excluding itself from all forms of practical or theoretical reasoning, art is condemned to oscillate between an illustrative function reflective of and subordinate to knowledge, and an ineffable expressive capacity that is irreducible to any rational measurement, explanation, or instrumental use. Far from having fully acknowledged the bankruptcy of the conceptual framework of modernism, contemporary art has universalized it, projecting it into a transnational utopia of free market fluidity. As such, the contemporary “expanded field” (Rosalind Krauss) of art merely performs, semantically and materially, the neoliberal crisis: it is obsessed with escape, but knows of no outside; it insists on its agency in the world, but disavows any direct causal, logic, or pragmatic impact on it.

*Glass Bead* contends that this picture of the space of art (its long history of ontological catastrophes and its present epochal deadlock) rests upon a misdiagnosis of the relation between cultural production and rationality.<sup>7</sup> The fact that scientific rationality and technological abstractions destabilize and transform our default—manifest—apprehension of the world must be understood as the starting point for the artistic enterprise, rather than as a cognitive and political pathology that art should remedy. As much as art cannot simply be mobilized to cure dysfunctional forms of politics through social activism, nor can it simply be considered a social mediator between more specialized and less accessible fields of knowledge production (such as philosophy, physics, mathematics, climatology, geology, etc.). Rather than considering that art can excavate an immediacy concealed by such specialized forms of knowledge, we understand artistic practices as modes of thought mediating forms of conceptual and material operations.<sup>8</sup> Understood as operating within the rule-governed space of rationality, working at once through abstraction and material

contingencies, artistic practices cut across the abstract plane against which these specific forms of knowledge are designed and isolated, questioning their relative distribution, and therefore potentially destabilizing and transforming the ground on which they rest. Rethinking the relation that art entertains with abstraction therefore implies conceptualizing it as a site of experimentation for the mutual penetration and destabilization of thought and matter, making explicit and thus transforming both the static picture of their traditional opposition and their overly fluid mixture in contemporary critical theory. Claiming art as a site of operations on abstraction hence means mobilizing art as a technique of reorientation of thought, out of its candid intuitions of itself and headlong into the complex ramifications of its diverse engagements in the dynamics of political, epistemic, and sociocultural formations<sup>9</sup>.

### **A Model for Navigation**

While this entails considering that art is as much a part of reason as other fields of thought such as science and philosophy, it does not mean that these disciplinary divisions can be forced into false equality<sup>10</sup>. In order to understand both the differences and the unity of these modes of reason it is necessary to acknowledge the immanence of the activity of modeling to thought. A model is an abstraction that intervenes in the reciprocal development of means and ends. There is no intelligence without modeling and abstraction. Only the automaton exists in the concrete immediacy of the world. For logic-using agents, playing the game of ends and means is not a choice but a necessity. We either passively accept models, by organizing ends and means according to their implicit rules and their often brutal abstractions, or, by making their rules explicit and revealing the form of their abstractions, we can actively question models, transforming ends and means in the process.

A fundamental characteristic of the model, and of intelligence in general, is the spatial organization of possibilities. All knowledge presupposes a gestural level of constitution, a movement by which the concrete is perturbed by an abstract line. This gesture of abstraction at once reduces the world by a ruthless act of disregard, and at the same time augments it by introducing new possibilities, transforming the available means and generating unprecedented ends. However, although modeling is a rational procedure of abstraction at every level of sapient interaction, the different ways in which science, philosophy, and art relate to this activity need to be distinguished.

Scientific theories model nature; they refer to an aspect of the world and are subject to experimental validation or logical argumentation on this basis. Though it may represent or refer to some aspect of the world, a work of art, by contrast, also constructs a world. In this it is fundamentally self-referential. It refers to the act of reference; it models the activity of modeling. In that sense, it is different from scientific reasoning. Scientific reasoning is naturalistic; it is true or false depending on what is or is not the case. Artistic reasoning is a properly normative activity defined by the discursive pertinence of its imaginative construction. It projects a could or a should, an ought to be that is irreducible to any naturalistic determination of what is. Yet, this does not mean that science is purely descriptive while art is purely prescriptive. Scientific models are also constructive—they are not passive, neutral, or static with regard to their object. A model orients activity and may have performative or counter-performative effects on the world it describes. A model, such as that picture of the world implied by a scientific theorem, is a structurally constrained system or instrument defined by the functionally constrained purposes it serves, a reciprocal coordination of means and ends that alters the world it pictures<sup>11</sup>.

Science makes means subordinate to ends (for example when it states that the function of life is reproduction), while contemporary art is allergic to any singular imposition of ends (it refuses any reduction to a single purpose). However, if a scientific model allows for an object within the world to be grasped, an artwork, like a philosophical argument, has the capacity to grasp the act of grasping itself. It is all too easy to see this in meta-theoretical terms, by subordinating these heterogeneous forms of thought to a master narrative, such as the Platonic conception of philosophy or the Romantic conception of art. However, in constructing a world, a work of art functions as a device for navigation in this world, as a technology for the production of spatial and temporal syntheses, and is thus a crucial facilitator for the creative organization of behavior.

*Glass Bead* thus foregrounds art as a local site of abstraction within the global space of thought—a site from which one can not only map but navigate different scales of complexity, a site from which thought can mobilize itself for its self-transformation both at the global level (its general cognitive scaffolding) and the local level (its specific conceptual and disciplinary domains, art being one of them). In such a conception, art becomes a specific yet generalized mode of navigation across diverse fields, especially equipped for the construction of knowledge syntheses. Such syntheses therefore imply going beyond the simple connections that could be made between them, be they thematically, methodologically, or performatively articulated. To consider art practices as

modes of navigation involves acknowledging that any mediation between distinct fields also alters the global structure of the space in which it happens. To navigate hence does not only mean to connect different things, but to address the dynamic type of space that such navigation constructs<sup>12</sup>. Considered in these terms, the question of knowledge syntheses becomes both an epistemic and a political issue, since the spatial models according to which such syntheses can be constructed are not simply determining what is possible to know, but also what it is possible to do.

### **Topos, Site, Transfers**

Following such a spatial account, navigation and knowledge synthesis can be conceived as procedures pertaining to dialectical articulations between, on the one hand, local and specific operations, and, on the other hand, global and generic models according to which these operations can be extended<sup>13</sup>. Yet, such procedures remain to be constructed. In historical terms, we are left with two inherited models of spatial organization which, in our view, are equally inadequate to produce such syntheses. While modern universalism worked as a global projection superseding localities that were not considered able to alter its global structure, the postmodern critique of universalism foregrounded relative trajectories that, working from one locality to another within that structure, have been considered to prevail over any global system. By either forcefully projecting the global onto the local, or rather excavating the local regardless of its relation to any global structure, these two opposed spatial models remain relatively unable to achieve any articulation between these dimensions.

Aiming to move beyond these insufficient spatial models, each issue of the journal is dedicated to the exploration of a *site*<sup>14</sup>. A core concept of *Glass Bead's* methodology, the notion of site is defined in broad terms. Designating a geopolitical locality as well as a conceptual territory, a fictional entity, a musical expression, or a material formation, a site indexes for us at once an area or a region situated at the intersection of different forms of knowledge, as well as its aesthetic, political, and conceptual stratifications. Far from reducing the site to a topographic point in the space of knowledge, the journal aims to unfold it as the spatialization of a dynamic epistemic figure that cannot be understood through extrinsic determinations alone, but rather through an intrinsic mode of navigation and orientation<sup>15</sup>. The sites that the journal will explore can thus be seen as instruments for the transformation of the epistemic conditions in which they operate. For us, these sites act as vehicles for travelling across multiple disciplinary regions and scales of abstractions.

Although it draws on the way in which this concept has been framed in art theory since the 1960s, our conception departs from its close connection to both specific geographic places and calls to the situatedness of aesthetic experience. The anti-formalist discourses that promoted site-specificity supported the materialist critique of the autonomous artwork. But, as the concept of site has been increasingly identified with an enclosed, absolutely specific locality, it has now become a political and artistic deadlock. By reducing forms of knowledge to the identity of their local point of emission, the localist approach to sites fails to articulate their global ramifications.

Our approach to the concept of site takes its inspiration from contemporary mathematics, in which the concept of space has been radically enlarged. From Category theory to Topos theory, the recent history of the discipline has been marked by a generalization of geometry aiming to reintegrate and synthesize increasingly diverse and specified fields and practices.<sup>16</sup> Broadly put, this process has been that of a progressive and irreversible mutation: a double process of emancipation where geometry was progressively freed from the ascendancy of direct experience, and where any external frame of reference was abandoned in favor of an ever more intrinsic apprehension of space. This historical mutation had two phases. First, through topology in the nineteenth century, where space was no longer simply understood for what it is in a given state but for what it can possibly become, and where notions of scale and measurement gave way to an emphasis on continuous transformations and on the limits of such transformations. Secondly, through Topos theory in the 1960s, where topology was extended and generalized to the epistemology of mathematics itself. Descending one step further in the intrinsic geometry, Topos theory conceived the diversity of mathematical theories as sites, understanding them as spatial entities possessing their own borders and continuities. By identifying invariants and possible translations among and across these sites, Topos theory can be said to have prolonged and completed the conceptual revolution initiated in the nineteenth century. In elaborating the mathematical notion of site, it thus opened to a conception of space that, rather than acting as a mere container, can be understood as forming itself through the dynamics of binding and transforming its modes of reasoning<sup>17</sup>.

This does not mean, however, that such mathematical theories should be seen as ready-made models that it would suffice to import into other conceptual domains. We do not advocate a literal application of mathematical models to art, but neither do we mobilize them as mere metaphors. Rather, by mobilizing the concept of site as a vehicle

allowing for the binding and transformation of diverse modes of reasoning, our relation to contemporary mathematics is marked by a commitment to elaborate its project of dynamic synthesis and unification within the cultural realm.

### **Site 0: Castalia**

The site on which this issue focuses is Castalia, the fictional province imagined by Hermann Hesse in *The Glass Bead Game* (1943). Set in Central Europe some five hundred years in the future, Castalia hosts a peculiar society entirely dedicated to the pursuit of pure knowledge. In this cloistered setting cut off from the world and its historical and political vicissitudes, the monastic inhabitants of Castalia, unencumbered by technological or economic concerns, are free to develop obscure objects of enquiry devoid of practical implications in the world. Hesse presents Castalia as an idealized vision of the modern university, encapsulating the humanist search for universal knowledge, in which the Game provides an aesthetic ground for the unification of ideas beyond disciplinary frontiers. The apex of this scholarly order is the mastery of a complex interdisciplinary game that synthesizes all forms of knowledge, in which musical motifs, philosophical propositions, and scientific formulae all occupy the same rarified epistemic space.

Mobilizing Castalia as an equivocal image, at once archetype of modern universalism and fortress delegitimized by its own enclosure<sup>18</sup>, our aim in this issue is to revisit and transform the Castalian model for the unification of reason. Opening Castalia and its modernist locus to the widened conception of space engendered by contemporary mathematics provides the conditions for the reformulation of a truly dynamic and transformative game of synthesis. Our project here is not to rebuild the old foundationalist dream of a completed universal language, nor to reconduct the standard critique of rationality, but rather to construct the conditions for dynamic transits that can transform the milieu in which rationality operates. Exploring *Glass Bead's* conceptual, political and methodological prerequisites, this site 0 lays the ground for our project at large. It gathers contributions exploring the very nature of the space of modern rationality figured by Castalia, as well as the ways in which the contradictions of this space can be outstripped. This issue is comprised of essays by, and interviews with, philosophers, mathematicians, artists, art historians, curators, anthropologists, and theorists exploring contemporary forms of thought that, while recognizing the diversity of contexts in which specific forms of knowledge are produced, aim to produce universal yet dynamic forms of syntheses between them.

Contrary to the glass bead game, in which the synthetic means at play are articulated to purely contemplative ends, our contention is that any synthetic game always implies a reciprocal articulation between ends and means. Implicitly based on the free play of ideas in a purified aesthetic realm, the game imagined by Hesse conceptualizes reason as an activity that can only be perfected according to its separation from social and political relations. This issue of the journal rather draws on the assertion that reason is primarily grounded in practical orientation, socially embedded in discursive and non-discursive practices as well as relatively formalized conceptual frameworks. *Site o: Castalia, the Game of Ends and Means* seeks to rearticulate the game of synthesis imagined by Hesse by modeling it as an intrinsic modulation of ends and means, therefore enlarging not only the space of knowledge, but also that of action.

Making a move in this game of ends and means is necessarily bound to a collective act of self-transformation. Playing this game entails committing to an ongoing process of construction and revision that continually changes its nature. It does not leave us intact as players by preserving what we are but involves us in a constant redefinition of what we can be and ought to be.

The editors want to thank all the contributors to this issue, as well as all the workshop participants and speakers that took part in this first year of research. Their work has been a crucial and general influence on our conception of this project and the writing of this editorial.

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## Footnotes

1. See the Audio Research Program, Reza Negarestani, *What Philosophy Does to the Mind*
2. See in this issue Laboria Cuboniks, “Xenofeminist Manifesto : A Politics for Alienation”
3. See in this issue Giuseppe Longo, “The Consequences of Philosophy”
4. See in this issue Ray Brassier, “Transcendental Logic and True Representings”
5. See in this issue Anselm Franke, “The Third House”
6. See in this issue Linda Henderson, “The Forgotten Meta-Realities of Modernism: *Die Uebersinnliche Welt* and the International Cultures of Science and Occultism”
7. See in this issue Amanda Beech, “Culture Without Mirrors—Restructuring Creative-Cognitive Power”
8. See in this issue Tristan Garcia, “The Photographic Real”
9. See in this issue Mat Dryhurst, Holly Herndon and Alex Williams, “Re-Engineering Hegemony”
10. See in this issue Gabriel Catren, “The Trans-Umweltic Express”
11. See in this issue Freeman Dyson, “The Way of the Pacific”
12. See in this issue Tarek Atoui, “Transformative Circuits”

13. See in this issue Martin Holbraad and Eduardo Viveiros de Castro, “Ideas of Savage Reason”
14. See in this issue Keller Easterling and Benedict Singleton, “Forging Rules”
15. See in this issue Deneb Kozikoski, “The Turn of the Canoe”
16. See in this issue Olivia Caramello, “The Theory of Topos-Theoretic Bridges: A Conceptual Introduction” and Andrée Ehresman & Mathias Béjean, “The Glass Bead Game Revisited: Weaving Emergent Dynamics with the MES methodology”
17. See in this issue Fernando Zalamea, “Multilayered Sites and Dynamic Logics for Transits between Art and Mathematics”
18. See in this issue Guerino Mazzola, “Melting Glass Beads : the Multiverse Game of Gestures and Strings” and Peter Wolfendale, “Castalian Games”

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**Glass Bead** is an international research platform and journal. Glass Bead was conceived and is run by Fabien Giraud, Jeremy Lecomte, Vincent Normand, Ida Soulard and Inigo Wilkins.

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JOURNAL > SITE 0: CASTALIA, THE GAME OF ENDS AND MEANS | 2016

## Castalian Games

Peter Wolfendale

Precisely what it means for a work of fiction to be *speculative* remains a matter of some controversy in literary circles. I do not intend to settle the debate on these matters, but rather to present *The Glass Bead Game*—Hermann Hesse’s final and most acclaimed novel—as a paradigm of fiction’s *speculative* potential.

Hesse’s novel is many things. It is clearly modernist in its style, playing with the elements of a classical bildungsroman. It is rigorously hypothetical in its setting, extracting a handful of tendencies from its present, projecting them into minimalist future. It is deeply philosophical in its scope, explicitly referencing the canon of modern European philosophy, implicitly encoding its themes in institutions and characters, and symbolically crystallizing their tensions into a singular conceptual innovation, the Glass Bead Game—a universal language and emblem of intellectual synthesis.

However, there are equally things it is not. Its stylistic modernism does not collapse into *formalism*, either in the critical sense of eschewing connections to its context or the technical sense of prioritizing structure over substance. Its hypothetical setting belongs neither to science fiction nor to fantasy, scrupulously avoiding both *naturalistic reflections* and *fantastical narratives*. Its philosophical ambition does not translate into didacticism, refusing reduction to either historical prediction or allegorical moralism. The life of Knecht in Castalia is a peculiarly austere hypothesis. Its carefully delimited deviations from the actual serve to evoke and embody ideas drawn from philosophy rather than science or mythology, but what the story extrapolates from them is less a singular thesis cloaked in narrative than an intricately crafted opportunity for further thought. The *hypothetical austerity* of Castalia forms the basis of the *speculative richness* of the Game.



Hermann Hesse enjoying naked mountaineering in Amden, photographed by his first wife Maria in summer 1910. (Image: German Institute of Literature in Marbach)

## I. Castalia

Hesse presents Castalia as the natural evolution of the ideal underlying the modern university—the *universitas litterarum*—encapsulating the humanist search for knowledge and self-understanding, by uniting teaching, research, liberal arts, and exact sciences in the same institution. In establishing the Game as the symbol of Castalian culture, he presents it as the embodiment of this ideal:

*The same eternal idea, which for us has been embodied in the Glass Bead Game, has underlain every movement toward the goal of a universitas litterarum, every Platonic academy, every league of an intellectual elite, every rapprochement between the exact and the more liberal disciplines, every effort toward reconciliation between science and art or science and religion.<sup>1</sup>*

However, the Game also symbolizes the form that this reconciliation takes within Castalian culture. Castalians study scripture and theology, music and poetry, and can appreciate and even recreate their subtle nuances, but they are neither believers nor artists, refusing either to practice or to create.<sup>2</sup> The Game's combination of high ritual and subtle creativity enables it to subsume the role of both religion *and* art within Castalian society. This subsumption is not merely a shift in the value placed in certain activities—it corresponds to a change in the understanding of value *as such*.

It is easy to dismiss the Castalian attitude to religion as a mere consequence of its explicit fidelity to the Enlightenment, but the Castalian attitude to art indicates an implicit fidelity to an entirely different historical moment—the End of History, the teleological plateau in the evolution of our collective self-consciousness articulated by Hegel across his various philosophical works.<sup>3</sup> Hegel is the philosopher most often invoked in the course of the novel.<sup>4</sup> He holds not only that the world is in truth Absolute Spirit—the unity of Absolute Idea (God) and its self-externalization (Nature)—and that world history is the process through which Spirit (as Culture) realizes itself (as Freedom) by achieving progressively greater self-consciousness, but that self-consciousness of this very truth is progressively manifest in art, religion, and ultimately philosophy.<sup>5</sup> Hegel does not see the end of art or religion as the point at which they cannot be pursued any further and thus must be abandoned, but as the point at which their role as privileged forms of cultural self-consciousness has been subsumed by philosophy. Hegel's own philosophy marks the End of History by realizing this subsumption—constituting the foundation for all future progress in spiritual self-consciousness.

Hesse makes it quite clear that, for all its conceptual subtlety, the Glass Bead Game is not philosophy:

*Philosophizing should be done only with legitimate tools, those of philosophy. Our Game is neither philosophy nor religion; it is a discipline of its own, in character most akin to art. It is an art sui generis [...] The philosopher Kant [...] once said that theological philosophizing was “a magic lantern of chimeras.” We should not make our Glass Bead Game into that.*<sup>6</sup>

This is sufficient to discourage us from seeing the Game as the symbol of Hegelian philosophy. Nevertheless, the manner in which Castalia realizes the ideal of comprehensive humanistic inquiry exemplifies Hegel's account of the historical trend towards increasing collective self-consciousness through the evolution of social institutions. The prohibition on artistic creation reflects the notion that art has nothing more to tell us about ourselves, restricting the role of artistic institutions to preserving

the memory of lessons already learned. The ascension of the Game reflects the notion that the true value of art (Beauty) lies in enabling self-consciousness—by expressing the Idea of Freedom in various forms (e.g., in the emotional range of song or the ethical conflicts of Greek tragedy)—insofar as the Game aims at this value more directly, by exploring the freedom of thought itself (e.g., exposing mathematical analogies between disparate themes or resolving tensions between conflicting concepts).<sup>7</sup>

For Hegelian and Castalian alike, the essence of our freedom is the capacity for rational thought (Reason), and it is therefore unsurprising that each seeks the highest consciousness of freedom in the pure exercise of this capacity—either *contemplating* the Absolute or *playing* the Game. Still, there are deeper connections between their conceptions of freedom. There is a long tradition in German philosophy that aims to overcome the perceived opposition between freedom and duty. This tradition has two interlocking components. The first, initially developed by Kant, is the idea that individual freedom consists not in the availability of options for action, but in the capacity for *rational self-determination*. This means the capacity to respond to reasons for action (e.g., moral duty) constrained by neither external authority (e.g., arbitrary political power) nor internal desire (e.g., arbitrary libidinal impulse). The second, skillfully elaborated by Hegel, is the idea that this freedom can nevertheless be realized through social institutions. This means that socially imposed constraints on some forms of action (e.g., taxes on personal spending) can simultaneously enable others (e.g., investment in shared services), and that the net result can be an overall increase in individual freedom. Together, these explain the exercise of legitimate authority as bound by a corresponding responsibility to fulfill some role within a social institution that realizes freedom. Hegelian themes are thus clearly present in the understanding of *value* embodied by Castalia (and its Game) and the understanding of *freedom* embodied by the Order (and its hierarchy), but these are largely enveloped within the novel's engagement with the concept of *history*. According to Knecht, Castalians have “no confidence in that so-called philosophy of history of which Hegel is the most brilliant and most dangerous representative.”<sup>8</sup> Yet this official rejection belies a deeper affinity manifest in the Castalian attitude to history, articulated by Knecht's Benedictine interlocutor Father Jacobus:

*“You mathematicians and Glass Bead Game Players,” he would say, “have distilled a kind of world history to suit your own tastes. It consists of nothing but the history of ideas and of art. Your history is bloodless and lacking in reality. [...] You treat world history as a mathematician does mathematics, in which nothing but laws and formulas exist, no reality, no good and evil, no time, no yesterday, no tomorrow, nothing but an eternal, shallow mathematical present.”<sup>9</sup>*

Knecht’s life as a student in Castalia and member of the Order serves to justify this assessment. Knecht comes to appreciate both the historical and political conditions of Castalia’s existence *and* its systematic ignorance of these conditions. Castalians act as if their province is a *world-historical* achievement that cannot be undone—as if the history of societies mirrored the history of ideas, in which nothing is lost to the memory of scholars.

In becoming Magister Ludi, Knecht achieves a singular position in Castalian society, combining the highest authority and highest responsibility toward the symbol of its governing ideal: the Glass Bead Game. However, we should not assume that his eventual decision to abdicate his position is a straightforward rejection of this ideal. Knecht is in a better position to appreciate the value of Castalia and the Game than anyone, but he is also in a better position to appreciate their historical precariousness. He sees that the unique *nonutilitarian* value which makes the Game so precious is precisely what puts it in danger, and that treating it as the culmination of a teleological development incorporating science, art, and religion does nothing to assuage this danger.<sup>10</sup>

Knecht’s break with the Hegelian conception of history thus forces him to reevaluate the conceptions of freedom and value lodged within it, but the result is more of a reorientation than a rejection.<sup>11</sup> This is best indicated by the quotation with which Knecht ends his circular letter:

*Times of terror and deepest misery may be in the offing. But if any happiness at all is to be extracted from that misery, it can be only a spiritual happiness, looking backward toward the conservation of the culture of earlier times, looking forward toward serene and stalwart defense of the things of the spirit in an age which otherwise might succumb wholly to material things.<sup>12</sup>*

The life of the mind that the Game symbolizes retains its *unconditional* value (Beauty), but it must ever be practically subordinated to the *conditions* under which it can be realized (Right). This implies a new compact between Castalia’s two roles, in which its pedagogical responsibilities toward the world beyond must be prioritized over its aesthetic devotion to thought for its own sake.

## II. The Game of Games

Perhaps the most significant feature of the above interpretation is that the symbolic role of the Glass Bead Game has little to do with its status *as a game*. Of course, much of the Game's symbolic power derives from the fact that it is described obliquely, through various suggestive analogies and allusions, including its very name, which refers to its mathematical origins in the manipulation of special abacuses, rather than anything to do with its modern practice.<sup>13</sup> Despite many earnest attempts to devise rules by which the Game could be played in reality, none has come close to capturing the air of sublime mystery and intellectual subtlety that Hesse so deftly weaves about it.<sup>14</sup> Nevertheless, there is more to the Game *qua* game than is required for the symbolic role already described, and more to the core themes of freedom and value that can be revealed by disentangling them from the concept of history and connecting them to the concept of game.

Hesse provides an overview of the origins of the Game in the historians' introduction to Knecht's biography, and describes its general character and how it is played at various points throughout the book. The following passage is perhaps the most representative:

*Under the shifting hegemony of now this, now that science or art, the Game of games had developed into a kind of universal language through which the players could express values and set these in relation to one another. Throughout its history the Game was closely allied with music, and usually proceeded according to musical or mathematical rules. One theme, two themes, or three themes were stated, elaborated, varied, and underwent a development quite similar to that of the theme in a Bach fugue or a concerto movement. A Game, for example, might start from a given astronomical configuration, or from the actual theme of a Bach fugue, or from a sentence out of Leibniz or the Upanishads, and from this theme, depending on the intentions and talents of the player, it could either further explore and elaborate the initial motif or else enrich its expressiveness by allusions to kindred concepts.<sup>15</sup>*

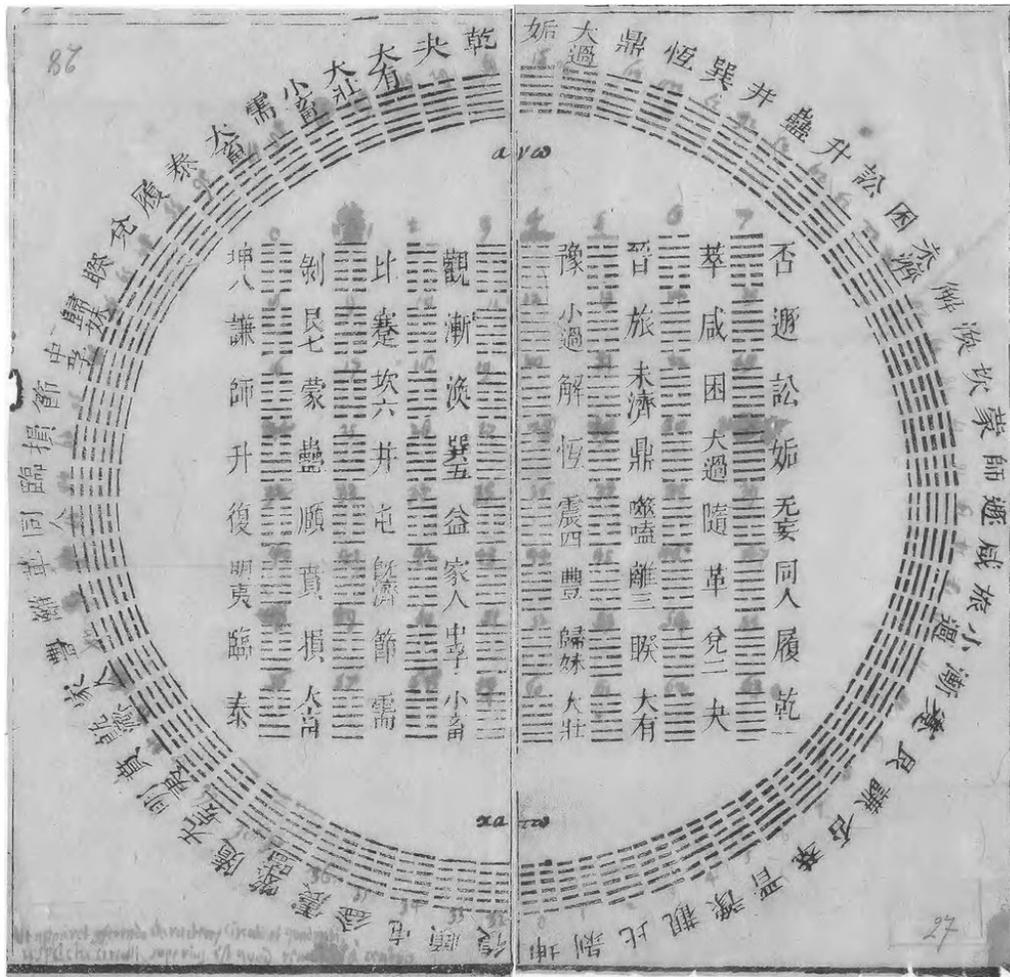


Diagram of i-ching hexagrams owned by Gottfried Wilhelm Leibniz

The heart of the Game is its *language*—an ideographic script comparable to Chinese—whose vast and scrupulously maintained lexicon enables it to communicate ideas from any discipline, and whose subtle yet mathematically precise syntax enables it to express correspondences between ideas across disciplinary boundaries.<sup>16</sup> This aspires in some ways to the notion of a *characteristica universalis* proposed by Leibniz. However, while it certainly realizes the encyclopedic ambition of Leibniz’s proposal, it falls short of the corresponding logical ambition of a *calculus ratorator*—a universal framework in which every dispute between competing intellectual positions can be resolved by means of demonstration. By contrast, the Game develops the affinity between mathematics and music into a *lingua sacra*—a sacred language in which every harmony, symmetry, or counterpoint between disparate themes can be represented as a pure aesthetic abstraction.<sup>17</sup> This opposition manifests an incipient tension between the *universitas litterarum* as a search for Truth, and the Game as a search for Beauty.

The selection of a given Game's themes and even something of their progression can be decided in advance, and Knecht spends much time in the novel composing and comparing such Games in private.<sup>18</sup> However, the Game proper is meant to be played in public, by a number of players, whose contributions to the way the themes unfold will distinguish it from any other Game based on the same themes,<sup>19</sup> and whose mutual cooperation can decisively determine the overall success of the Game.<sup>20</sup>

### A. Two Threads in the Theory of Games

The concept of *play* was a significant concern of German philosophy, beginning with Kant's account of the free play of the faculties in the experience of Beauty, and developed in Schiller's account of the play-instinct as the essential unity of man's active and passive dimensions, before passing into psychoanalysis in Freud's theory of drives and hermeneutics in Gadamer's theory of art. However, this concern did not really extend to the concept of *game*, which only began to be theorized on its own terms during the writing of *The Glass Bead Game* (begun in 1933) and the decades following its publication (1946), in distinct fields: *mathematics* and *sociology*.

Mathematicians have been interested in games since the beginning of probability theory, but it was only in the early twentieth century that something like a general framework for studying games and proving theorems regarding them began to emerge, achieving explicit form in Jon von Neumann and Oskar Morgenstern's *Theory of Games and Economic Behavior* (1944) and full generality with John Nash's "Non-Cooperative Games" (1951). The *game theory* that emerged from these innovations is essentially the study of *interactive decision spaces* constituted by rules that fix the players' possible actions (e.g., the permissible movements of chess pieces), the relations between them (e.g., taking an opponent's piece limits their possible actions), and the goal states or *payoffs* they are presumed to aim at (e.g., checkmate). Such study delineates *strategies* for achieving specific goals under certain conditions (e.g., ensuring checkmate given a particular endgame configuration), which choose plays, or paths through the decision space, in response to the actions of other players. The limit-case of this is a *winning strategy*, which guarantees the desired outcome no matter how the other players act. These strategies only exist in so called deterministic games (e.g., chess, checkers, etc.), and even then only some of these games are tractable enough to have been *solved* (e.g., tic-tac-toe).

The contrast between deterministic and nondeterministic games is only one aspect of the rich taxonomy that game theory has developed since its inception, incorporating distinctions between types of action (e.g., simultaneous/sequential, discrete/differential,

and finite/infinite), types of payoff (e.g., cooperative/competitive, zero-sum/open-sum), and types of information (e.g., perfect/imperfect and complete/incomplete). However, this taxonomy includes many activities that we would not usually describe as games (e.g., purchasing negotiations, the prisoners dilemma, nuclear war), and excludes many activities we would so describe (e.g., playing with dolls, word association, Dungeons and Dragons). Moreover, many nondeterministic games included in the taxonomy partially resist strategic analysis (e.g., baseball), insofar as the *actions* they involve cannot simply be reduced to *decisions* (i.e., one does not simply *decide* to hit a home run). Stochastic games such as backgammon are both nondeterministic and completely captured by game theory, insofar as the uncertainty they involve is strictly *circumscribed* by the rules (even if it is *realized* by rolling dice, shuffling cards, or computerized random number generation). By contrast, the uncertainty involved in baseball, competitive martial arts, or a scavenger hunt is only *mediated* by the rules, insofar as they incorporate elements of the world into the game (e.g., equipment, players, locales). This extrinsic uncertainty must then be folded back into game theory by incorporating independent causal and statistical analysis of these elements (e.g., hitting mechanics and sabermetrics).



Go players, published in *Miscellanea Berolinensia* 1710.

The foundational text in the sociology of games is Johan Huizinga's *Homo Ludens* (begun in 1933 and published in 1938).<sup>21</sup> Huizinga does not really present a theory of games as a distinct form of activity, but rather aims to provide a theory of play as the root of all culture, expressed in everything from law and language to war and religion. He defines play as an activity that displays four connected features: *freedom* of action, *independence* from ordinary life, *delimitation* in space and time, and *governance* by fixed rules.<sup>22</sup> Play thus tends to be parceled out into discrete activities, which become games or rituals as the limits/rules that separate them from ordinary life are formalized:

*The arena, the card-table, the magic circle, the temple, the stage, the screen, the tennis court, the court of justice, etc., are all in form and function play-grounds, i.e. forbidden spots, isolated, hedged round, hallowed, within which special rules obtain. All are temporary worlds within the ordinary world, dedicated to the performance of an act apart.*<sup>23</sup>

Although Huizinga agrees with Schiller that the play-instinct is an essential feature of humanity, he does not think it is unique to humans. He sees the same “irrational” drive at work in the behavior of kittens and chess masters.<sup>24</sup> The reason we are properly designated *homo ludens* (rather than *homo sapiens* or *homo faber*) is that this drive animates us to create and maintain these “temporary worlds within the ordinary world” to a degree found nowhere else in nature, resulting in the evolving networks of semi-autonomous social practices that constitute our cultures.

Huizinga’s failure to adequately define ‘game’ inspired Roger Caillois to provide the first comprehensive account of the concept in *Man, Play, and Games* (1958).<sup>25</sup> Caillois claims that Huizinga’s definition of play equally includes activities that aren’t games (e.g., religious ritual, legal debate, poetic composition) and excludes activities that are (i.e. noncompetitive games and gambling for profit).<sup>26</sup> However, he aims to revise rather than reject Huizinga’s “magic circle” approach.<sup>27</sup> He agrees with Huizinga that games are essentially *free* from obligation, and *separate* in space and time. He thinks that they are less independent than *unproductive*, contributing nothing new to ordinary life, but permitting redistribution of resources amongst players (as in gambling). He also thinks that while games necessarily involve players and things taking on roles (e.g., white/pawn, pitcher/base, astronaut/spaceship), this can take the form of *governance* by rules or *make-believe*. His distinctive innovation is to insist that the outcomes of games are essentially *uncertain*. These six common features give way to a comprehensive taxonomy of games, organized around four fundamental categories:

*I am proposing a division into four main rubrics, depending on whether, in the games under consideration, the role of competition, chance, simulation, or vertigo is dominant. I call these agôn, alea, mimicry, and ilinx, respectively. All four indeed belong to the domain of play. One plays football, billiards, or chess (agôn); roulette or a lottery (alea); pirate, Nero, or Hamlet (mimicry); or one produces in oneself, by a rapid whirling or falling movement, a state of dizziness and disorder (ilinx).<sup>28</sup>*

Caillois thinks that some combinations of these categories are permissible, such as the perennial pairing of *agôn* with *alea* (e.g., backgammon, poker, etc.), but that others are incompatible, such as *agon* with *ilinx* and *alea* with *mimicry*. Furthermore, he proposes “a continuum between two opposite poles” along which the games in each category can be arrayed, representing the conflict between *paidia*—the “frolicsome and impulsive exuberance” associated with free improvisation and the unstructured play of animals and children—and *ludus*—the countervailing “tendency to bind [*paidia*] with arbitrary, imperative, and purposely tedious conventions” associated with the formalized games of

adults.<sup>29</sup> Caillois presents this disciplining of *paidia* by *ludus* as the historical process through which the categories have come into their own as specific forms of play (e.g., sport, gambling, theatre), and begotten corresponding forms of culture (e.g., educational competition, economic speculation, political ceremony); though *ilinx* is distinguished primarily by its resistance these developments.<sup>30</sup>

## B. The Reason in Games

Having introduced these traditions, we can now identify an important tension between their approaches to the concepts of uncertainty and rationality. It is best to see Caillois's emphasis on the *uncertainty* of outcomes as a development of Huizinga's emphasis on the *freedom* of players. If this freedom is to be more than the availability of options (e.g., the choice of tokens in Monopoly: boot, dog, etc.), then the game must suggest reasons for choosing between courses of action (e.g., defeating an opponent, scoring points, or playing elegantly); but if these reasons are to be something other than further restrictions imposed by the rules, then the courses of action they prescribe must be uncertain. This argument reveals the paradox of game theory—its tendency to minimize the uncertainty of the games it studies, effectively eliminating it in deterministic games. However, the above argument also reveals a commitment to something like rational self-determination implicit in adherence to “the spirit of the game” at odds with Huizinga's claim that play is “irrational” and Caillois's account of *paidia*. If we look more carefully at Caillois's account, he says that a game “consists of the need to find or continue at once a response which is free within the limits set by the rules.”<sup>31</sup> This distinction between the *need* motivating the response and the *rules* limiting its form is obscured in the opposition between *paidia* and *ludus*, insofar as the latter ignores the difference between formalizing motivations *for* action and formalizing limitations *upon* action. The overall effect of this is that the absence of constraint characteristic of *paidia* becomes associated with the presence of spontaneity, wherein the *specific* motivations of play (e.g., the kitten's hunting practice, the child's sense-making of adult behavior, etc.) are subsumed by a *general* creative drive (i.e., the will to experiment, the artistic impulse, etc.). The opposition between *paidia* and *ludus* is thus framed as a conflict between irrationality, creativity, and freedom, on the one hand, and rationality, strategy, and law, on the other. It is tempting to acquiesce to this framing, if only to position game theory's paradoxical tendency to “break” games as the pyrrhic victory of *ludic rationality* over *paidaic irrationality*, but this would mean abandoning the rational motivation implicit in

“the spirit” of games that makes sense of their essential uncertainty. It would permit trivial uncertainty, consisting in the unpredictability of the player’s moves rather than their consequences.

We should rather see game theory as capturing only some of the motivations at work in games—those that can be precisely modeled by payoff functions and preference rankings—and thus as providing a truncated theory of rationality. Games with strictly formalized rules can incorporate surprisingly subtle systems of motivation, from goals that incorporate the uncertainties of the world (e.g., competitions to design better bridges) to *values* that shape the evolution of preferences (e.g., collaborative composition of beautiful narratives). Combined with the incredible ingenuity displayed by the master strategists of the ludic arts (e.g., chess masters, *Magic: The Gathering*<sup>™</sup> champions, etc.), this is sufficient to demolish the idea that creativity is somehow opposed to rationality—it is not a singular wellspring of novelty opposed to the concrete diversity of purpose. We have seen that the Glass Bead Game symbolizes many things, but its hyperbolic synthesis of ludicism and aestheticism makes it the perfect emblem of this rapprochement of reason and creativity. It not only represents the conceptual relation between freedom and value contained in Reason—it presents a *speculative vector* along which to explore this relation in the domain of games and play. However, traversing this vector requires delving deeper into the dynamics of the game, thus passing from the reason in games to the games in reason...

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## Footnotes

1. Hermann Hesse. *The Glass Bead Game*. London: Picador Classics, 1987. 16. Print.
2. Ibid [GBG]. 27. The exception to this ban on creation are the fictional ‘lives’ that each student is supposed to compose during their years of free study.
3. I would identify the *Science of Logic* and *Lectures on the History of Philosophy*, the *Philosophy of Right* and *Lectures on the Philosophy of History*, and the *Lectures on Aesthetics* and *Lectures on the Philosophy of Religion* as covering the important intellectual, political, and cultural elements of this thesis, respectively.
4. GBG. 16, 40, 81, 91, 122, 227, 351-352, 445.
5. G.W.F. Hegel. *Aesthetics: Lectures on Fine Art*. Trans. T.M. Knox. Oxford: Oxford University Press, 1975. Part I: Introduction, 91-105. Print.
6. GBG. 141.

7. At one point, Knecht even comes close to describing the Game as consciousness of the Absolute (*GBG*. 121): “For the dark interior, the esoterics of the Game, points down into the One and All, into those depths where the eternal Atman eternally breathes in and out, sufficient unto itself.”
8. *GBG*. 351. It is significant to note that Hesse based the character of Father Jacobus on the cultural historian and noted critique of Hegel's philosophy of history, Jacob Burckhardt (see Ziolkowski).
9. *GBG*. 168.
10. *GBG*. 360-362.
11. This reflects Hesse's own reorientation in the course of writing the novel, from depicting a seeming utopia to criticizing the principles underlying it (see Ziolkowski).
12. *GBG*. 363. As Ziolkowski points out (59), this is in fact a direct quotation from Burckhardt's “The Revolutionary Age.”
13. *GBG*. 31-32.
14. These attempts are catalogued in a wiki entry. Web. 19 October 2015. <http://www.ludism.org/gbgwiki/HomePage>
15. *GBG*. 39-40.
16. *GBG*. 14-15, 36-37.
17. *GBG*. 118-121.
18. See *GBG*. 195-202.
19. *GBG*. 14-15.
20. This is demonstrated by the disastrous Game planned by Thomas van der Trave but led by Bertram, the previous Magister Ludi's shadow, which is deliberately ruined by the elite players as a snub to Bertram (*GBG*. 210-216).
21. Johan Huizinga. *Homo Ludens: A Study of the Play Element in Culture*. London: Routledge & Kegan Paul, 1949. Print.
22. *Ibid.* 8-11.
23. *Ibid.* 10.
24. *Ibid.* 4.
25. Roger Caillois. *Man, Play, and Games*. Trans. Meyer Barash. Champaign: University of Illinois Press, 2001. Print.
26. *Ibid.* 3-5.
27. *Ibid.* 5-10.
28. *Ibid.* 12.
29. Caillois. 13-14.
30. *Ibid.* 27-33, 36, 54.
31. *Ibid.* 8. Emphasis altered

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## Melting Glass Beads—The Multiverse Game of Gestures and Strings

Guerino Mazzola

### Review of Hesse's Glass Bead Game

Hermann Hesse published his novel *Das Glasperlenspiel* (1943) in Zurich<sup>1</sup> and went on to receive the Nobel Prize in Literature in 1946. Hesse commented on the novel's substance, "It (the glass bead game) represented a symbolic form of seeking for perfection, an approach to that Mind which beyond all images and multiplicities is one within itself—in other words, to God."<sup>2</sup> There is no precise description of this glass bead game, but one passage describes to some degree what the game is about:

*Under the shifting hegemony of now this, now that science or art, the game of games had developed into a kind of universal language through which the players could express values and set these in relation to one another. Throughout its history the game was closely allied with music, and usually proceeded according to musical or mathematical rules. One theme, two themes, or three themes were stated, elaborated, varied, and underwent a development quite similar to that of the theme in a Bach fugue or a concerto movement. A game, for example, might start from a given astronomical configuration, or from the actual theme of a Bach fugue, or from a sentence out of Leibniz or the Upanishads, and from this theme, depending on the intentions and talents of the player, it could either further explore and elaborate the initial motif or else enrich its expressiveness by allusions to kindred concepts. Beginners learned how to establish parallels, by means of the game's symbols, between a piece of classical music and the formula for some law of nature. Experts and masters of the game freely move the initial theme into unlimited combinations.<sup>3</sup>*

The combination of mathematics and music was inspired by the work of music theorist Hans Kayser (1891-1964), who also lived in Switzerland when Hesse was creating his novel and whose work is a Neo-pythagorean mathematical theory of music.<sup>4</sup>

### **Frozen Glass Beads of Facticity**

Hesse's approach is clearly interdisciplinary. The technical character of the game, although not explicated in detail, is a combinatorial one. This follows from Hesse's enthusiasm for the famous Chinese *I Ching*, that yarrow stalk oracle and cosmology which results from the  $64 = 2^6$  combinations of six broken or unbroken lines (represented by yarrow stalks). This combinatorial cosmology gives the user a corresponding number of cosmological treads. It is not creative, but strictly selective. Hesse's combinatorial perspective is also evident from his enthusiasm for Gottfried Wilhelm Leibniz's calculus of logic, that idea of a perfect language where its conversations would be reduced to an exchange of formal logical formulas.<sup>5</sup>

This approach to reality as a combinatorial setup that can be controlled by formal logical calculus is the ontology we know from Ludwig Wittgenstein's *tractatus logico-philosophicus*,<sup>6</sup> the first sentence of which reads, "*Die Welt ist alles, was der Fall ist*" ("The world is everything that is the case"). This point of view is utterly reductionist. "What is the case" means *what has been made and is there now*. Once, forever? And who made it, and how? This does not matter. It is a perspective on existence as a collection of frozen objects. Take it or leave it, but you are only the user, much as in the medieval cosmology where humans could just observe God's world without any option of active

intervention. A recent book<sup>7</sup> confirms this view, describing a computer program that implements those combinatorial options in the spirit of *I Ching* and Leibniz. Hesse also stresses that his glass bead game is a search for God, that hidden universal spirit which connects all those diversities at the phenomenal surface.

In this style, Hesse's *Glass Bead Game* idea was realized through my own work in mathematical music theory in 1985.<sup>8</sup> However, it is not a neo-Pythagorean theory, but relies on modern mathematics (such as module theory, category theory, and algebraic topology). I wish to give a short overview of this work in order to demonstrate both its power and the fundamental limitations of the combinatorial method.

My approach started with Beethoven's famous *Hammerklavier* sonata, op. 106, and applied mathematical models of tonal modulation and paradigmatic classification of melodies (the latter in the spirit of Jean-Jacques Nattiez)<sup>9</sup> to a thorough analysis of Beethoven's harmonic and motivic construction. In the vein of Hesse's sketch of the game, I derived a mathematical formula that would describe his musical operations. This formula is the symmetry group  $\text{Sym}(C\#_{-7})$  of the diminished seventh chord  $C\#_{-7} = \{c\#, e, g, a\#$ . For the composition of a new sonata, we then exchanged this chord with an equally famous combination of pitches, the augmented triad  $C\#_{+} = \{c\#, f, a\}$ , and then used its symmetry group  $\text{Sym}(C\#_{+})$  to construe all modulations and the motivic germs of the new sonata. In other words, I threw the mathematical formula back into the musical realm. The resulting sonata *L'essence du bleu* has been published and released on CD.<sup>10</sup> The result could appear to be a real product of creativity. But it is simply a restatement of Beethoven's thoughts (viewed through the microscope of our mathematical analysis) with changes of corresponding structures, *mutatis mutandis*. I don't qualify this type of game as a truly creative one. There is no box whose walls are being opened into an unknown space outside; rather we are opening the door leading from one box (music) to the neighboring box (mathematics).

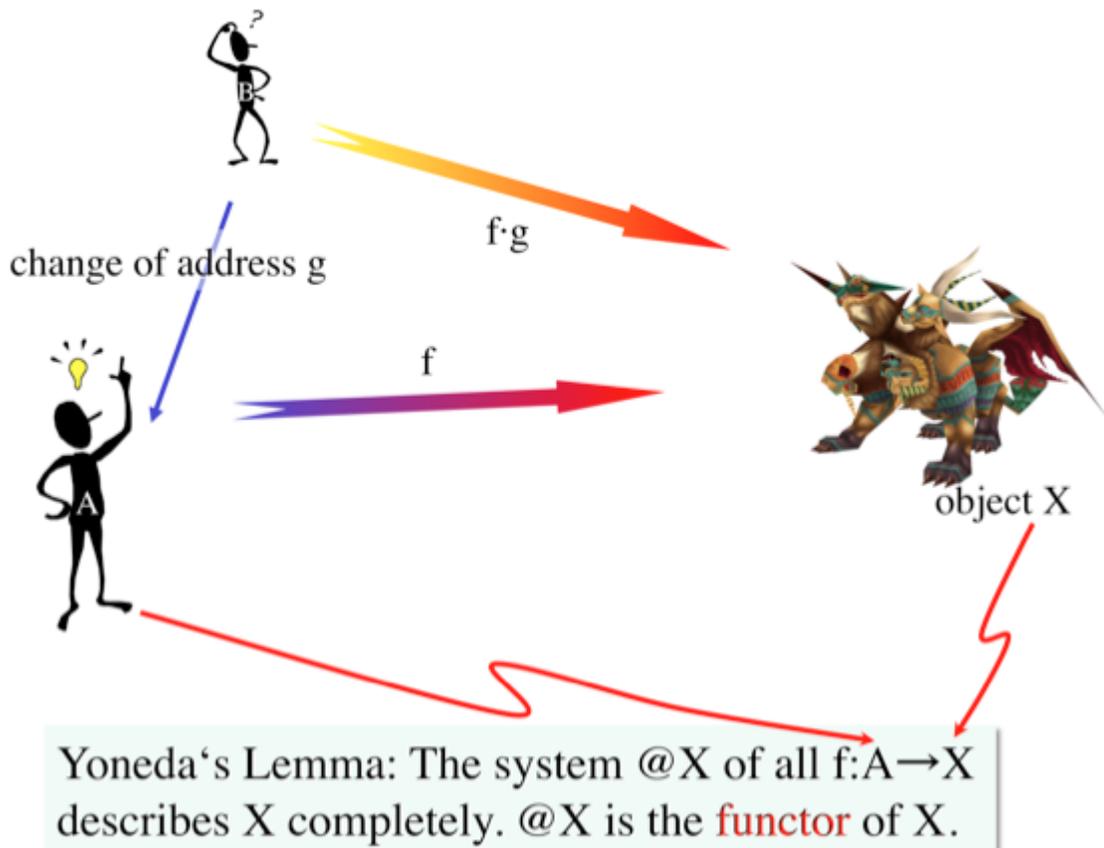
In what follows I shall explain how and in which domains of creative knowledge production Hesse's Glass Bead Game can be morphed into a less passive, factual, and rigid activity.

### The Revolution of Functors

A first conceptual revolution occurred in the new mathematics introduced by Samuel Eilenberg and Saunders Mac Lane with their theory of categories in 1945.<sup>11</sup> They analyzed the basic objects of mathematics, namely points—those objects that have no parts according to the classical approach by Euclid: *punctus est cuius pars nulla est*. For

categories, points were replaced by new elementary objects: arrows. Category theorists considered points as a result of a pointer action; “punctus” is the result or head of an arrow that pricks its target. The new concept of an arrow has three parts: its head and its tail, which are connected by a shaft symbolizing a pricking movement from tail to head. This seemingly harmless change introduced not just its pricked result, but the point of departure for a conceptual movement.

With this dramatic change, the subject (an arrow’s point of departure) was introduced and thereby the inclusion of the point of view or “address” from which the target point was addressed. In Alexander Grothendieck’s (1928-2014) algebraic geometry,<sup>12</sup> this paradigmatic revolution introduced a completely new conceptualization, a kind of relativity theory in geometry. This theory eventually led to the solution of hard problems, such as the Weil and Fermat conjectures, by Pierre Deligne (1974) and Andrew Wyles (1995), respectively.



Yoneda's Lemma replaces “whatness” by “suchness (Guerino Mazzola)

The big program was therefore to understand algebraic geometry as a science of relative points. The strongest general argument for this revolution was a simple, but powerful lemma, a result introduced by the Japanese computer scientist Nobuo Yoneda in 1954. He could prove that a space  $X$  can be completely described by its functor, i.e., by the system of all arrows  $f: A \rightarrow X$  where the address  $A$  runs over all possible choices. This functor, which we denote as  $@X$  replaces the space  $X$  as such by its system of variable arrows. More precisely, the lemma states that two spaces  $X, Y$  are isomorphic if and only if their functors  $@X$  and  $@Y$  are isomorphic as functors.

This result allows mathematicians to replace spaces (and in fact any objects of general categories) by their functors. In other words, the spaces *qua* objects with their intrinsic identity are replaced by their functors, which are systems of relative behavioral perspectives from variable addresses. In philosophical terms: the “whatness” of  $X$  is replaced by the “suchness” of the functorial entities  $@X$ . Mathematics is no longer interested in the abstract identities  $X$  but only in their behavioral systems, the functors  $@X$ .

This revolution generated a new paradigm of conceptual manipulation: Abstract spaces became only relevant via their behavior under specific but arbitrarily variable addresses. This means that a mathematical object could now be conceived as a distributed behavior, its identity reified as a collaborative system of addressed perspectives. With respect to Hesse’s original God-oriented approach, we now see that divine whatness being replaced by a “God-functor” that is realized in its (not necessarily representable) howness, and which our collaboration in a distributed identity experiences.

In mathematical music theory, I have composed a piece which is actually a recomposition of Pierre Boulez’s *structures pour deux pianos I*, following the functorial methodology<sup>13</sup> and applying Boulez’s idea of a creative analysis. My analysis of Boulez’s original composition followed György Ligeti’s analysis<sup>14</sup> which we reinterpreted as being a functorial procedure. Of course, Boulez did not know category theory when he composed that piece, but in the light of Yoneda’s lemma, his compositional strategy was in perfect congruence with modern functorial methods. I then implemented the functorial analysis in the rubato composer software and was able to recompose new variants of that piece by canonical address changes.<sup>15</sup> It is not an exaggeration to understand Boulez’s structures as *the historically first genuinely functorial composition*.

## Gestures in Philosophy and Science

This revolution generated a new paradigm of conceptual manipulation: Abstract spaces became only relevant via their behavior under specific but arbitrarily variable addresses. This means that a mathematical object could now be conceived as a distributed behavior, its identity reified as a collaborative system of addressed perspectives. With respect to Hesse's original God-oriented approach, we now see that divine whatness being replaced by a "God-functor" that is realized in its (not necessarily representable) howness, and which our collaboration in a distributed identity experiences.<sup>16</sup> A function is similar to an industrial plant: Input – Black Box – Output. As the great mathematician Henri Poincaré stated,

*To localize an object simply means to represent to oneself the movements that would be necessary to reach it.*<sup>17</sup>

He was aware that the gestural origin of geometry is beyond the formal mathematical mechanisms known at his time.

Let us clarify the radical abstraction from movements in mathematical formulas. Take a rotation in real three-space. This movement of the space's point around an axis is represented by a  $3 \times 3$  matrix  $M$  in linear algebra. But the matrix  $M$  does not show any information about the axis or the rotation's angle. You have to work quite hard to exhibit such an axis from  $M$ . The catchword is eigenvalues, and there are corresponding eigenvectors (that could play the role of rotational axes); the rotation's angle—if an eigenvector of a rotation can be found at all—is yet another problem to be solved by linear algebra. In other words: The mathematical representation of movements by matrices is a radical abstraction, a compactification of a movement in a formula, a kind of Fregean prison, where the original movement has been encapsulated. If we were to relate music to mathematics we could state here that they relate formulas to gestures, but in opposite directions: While mathematics compactifies gestures into formulas, music unfolds formulas into gestures.

Let us now focus on the gestural ontology which has thus far been hidden in contemporary functorial mathematics. For an excellent treatise on the history of gestures in European philosophy, we refer to Jean-Claude Schmitt's, *La raison des gestes dans l'Occident médiéval*.<sup>18</sup> He has given the most complete and important contribution to a history of the concept, philosophy, social and religious role of gestures during the early centuries of our modern Western culture. He exhibits the first (and still one of the best) definitions of a gesture, set forth by Paris-based theologian Hugues de Saint-Victor

(1096-1141):<sup>19</sup> "*Gestus est motus et figuratio membrorum corporis, ad omnem agendi et habendi modum*" ("Gesture is the movement and figuration of the body's limbs with an aim, but also according to the measure and modality proper to the achievement of all action and attitude.")

Observe that in Saint-Victor's definition, the specification *ad omnem agendi et habendi modum* is not semiotic, but merely describes the generic modality of action and being.

A gesture is a pre-semiotic concept; it does not automatically mean anything. The pointer gesture is also pre-semiotic since Saussurean structuralist semiotics is built upon the pointer from signifier to signified. A pointer is not a sign, but a "prerequisite" to any semiotic concept architecture.

In the twentieth century, gesture philosophy was above all developed by French philosophers, linguists, and mathematicians. Their works also differ from the Anglo-Saxon linguistic philosophy of gestures that was developed by Adam Kendon and David McNeil.<sup>21 22</sup> They focus on gestures that are co-present in linguistic utterances, and in this perspective, their concept of a gesture is strictly semiotic: Gestures are special signs that support the building of linguistic syntagms and contents. And they are always related to the body's actions; no more abstract concept of a gesture, such as a gesture in a musical melody or a thought gesture, is addressed. We shall not go into this rather restrictive conceptual line in more detail, and refer the reader to a forthcoming book<sup>23</sup> for further information.

The French tradition of gesture philosophy is characterized by the thesis that gestures constitute a proper ontology that is independent of, and typically precedes, semiotic systems; gesture is pre-semiotic.

Ahead of his time, French mathematician and philosopher Jean Cavallès in 1938 stated a core property of gestures that bypasses any semiotic basis: "Understanding is catching the gesture and being able to continue."<sup>24</sup>

In a remarkable series of interviews,<sup>25</sup> the painter Francis Bacon made clear that his diagrammatic gestures were more important to his creative work than mentally planned strategies: "The marks are made, and you survey the thing like you would a sort of graph. And you see within this graph the possibilities of all types of fact being planted." These insights inspired the French school of diagrammatic philosophers, led by Gilles Deleuze's comments on Bacon.<sup>26</sup> His ideas were then developed and deepened by gesture theorists and philosophers, such as Gilles Châtelet<sup>27</sup> and Charles Alunni.<sup>28</sup>

Cavallès' dancing thought (also shaped in Pierre Boulez's reflection on gesture in music)<sup>29</sup> was in fact stated with respect to mathematical theories, and as such it was one of the very first principles of gestural embodiment in mathematics, an idea now quite



Musical ontology requires a fourth dimension of embodiment comprising facts, processes, and gestures. This one is added to the three classical dimensions of signs, realities, and communication.

In short, we learn that gestures are generally understood as pertaining to a proper ontology that is not subordinate to semiotic lines of thought. In particular, the dominant French diagrammatic philosophy exhibits a sharp dichotomy between “wild” and “tamed” gestures, the former being independent or antecedent of semiotic realms, while the latter serve semiotic purposes as special types of signs. Conceptual creativity is exhibited in the layer of wild gestures. The communicative characteristic of (wild) gestures stresses their “howness” as opposed to their substantial “whatness.” Gestures are understood in their behavior, not in their absolute being (such as Kant’s thing-in-itself [*Ding an sich*]).

It is astonishing that despite the sensational success of Grothendieck’s “mathematical relativity theory,” there has been some work in the direction of replacing abstract Fregean functions and their formalism in category theory by gestural concepts. In *Categorical Gestures*,<sup>34</sup> I have started an investigation of the possibility of enriching Yoneda’s lemma with gestures, and the ultimate goal would be to replace the present abstract foundational entities of mathematics, such as sets or arrows, with gestures.

In an extraordinary interview with the Notices of the American Mathematical Society, the prominent mathematician Yuri Manin states his vision of future foundations of mathematics:

Instead of sets, clouds or discrete elements, we envisage some sort of vague spaces, which can be very severely deformed, mapped one to another, and all that while the specific space is not important, but only the space up to deformation. If we really want to return to discrete objects, we see continuous components, the pieces whose form or even dimension does not matter....I am pretty strongly convinced that there is an ongoing reversal in the collective consciousness of mathematicians: the right hemispherical and homotopical picture of the world becomes the basic intuition, and if you want to get the discrete set, then you pass to the set of connected components of a space defined only up to homotopy....That is, the Cantor points become continuous components, or attractors, and so on—almost from the start. Cantor’s problems of the infinite recede to the background: from the very start, our images are so infinite that if you want to make something finite out of them, you must divide them by another infinity....I see in this an analogy with the rebuilding of pragmatic foundations in terms of a category theory and homotopic topology.<sup>35</sup>

## Gesture Theory in Music

In music philosophy, music theory, and performance research, gestures have played a role of conceptual enrichment for a long time, but a full-fledged theory of musical gestures has still not been forthcoming, probably also because of the difficulty of an epistemologically valid conceptualization of gestures. Let us give a summary of some important gestural perspectives in the science and art of music.

Already in Eduard Hanslick's determination of musical content as "*tönend bewegte Formen*,"<sup>36</sup> (not just forms, but forms that are moved in a sounding manner, or moved in sound for short) the formal aspect, the formula, of a cadence, for example, is not sufficient to generate content. The form(ula) needs to be moved; it is deployed in a gestural dynamics. Hanslick illustrates his idea with the kaleidoscope, a dynamical arrangement of forms that receive their aesthetical value in a self-referential internal relationship.

In the twentieth century, German music theorist Wolfgang Graeser applied the mathematical theory of symmetry groups to restructure Bach's *The Art of Fugue*, but while observing dancers who interpreted Bach's *Goldberg Variations*, switched from abstract symmetries to what he called "Körpersinn," the sense of embodiment in music.<sup>37</sup> His book project on this topic could not be brought to fruition as Graeser felt completely alienated by such advanced ideas and committed suicide in 1928 at the age of 22.

In the theory of musical performance, Theodor Wiesengrund Adorno in 1946 wrote an essay on performance which set forth strong arguments for the gestural essence in performance. He followed Paul Valéry's famous dictum: "*C'est l'exécution du poème qui est le poème.*" In this essay, Adorno asserts that "the idea of performance pertains to music as such and isn't an accidental attribute." His analysis of the gestural basis of performance is as follows: "Correspondingly the task of the interpreter would be to consider the notes until they are transformed into original manuscripts under the insistent eye of the observer; however not as images of the author's emotion—they are also such, but only accidentally—but as the seismographic curves, which the body has left to the music in its gestural vibrations."<sup>38</sup> Adorno argues for what I have called "the score as a repertory of frozen gestures." He does not suggest that gestures have an emotional message; rather, he defends their nature as "vibrating" bodily utterances. At first sight, this may look overly materialistic and far from the symbolic meaning of musical creation, but Adorno insinuates a spiritual component in the gestural dynamics. This perspective is in fact supported by the very history of score notation. Originally, scores encoded the gestural

hints in the graphemes of Medieval neumes. These graphemes then successively morphed to the present notation, which has abstracted neumatic threads to discrete point symbols.

Adorno's student Renate Wieland and her fellow scholar Jürgen Uhde clarify their teacher's approach and apply it to their system of piano performance.<sup>39</sup> Wieland says: "Originally affects were actions, related to an exterior object, along the process of internalization they were detached from their object, but they are still determined by the coordinates of space....There is therefore something like gestural (space) coordinates." She makes it clear that gestures are abstractions from concrete actions which, however, remain geometric entities in some more generic space. Wieland also argues that the emotional connotation in music originally is e-motion, out-movement, and so the gestural transmutation is not an artificial construct, but the restatement of the original phenomenon.

American composer and music critic Roger Sessions has offered this beautifully clear description of the crucial but still underestimated role of gestures in performance: What I am saying is that we experience music as a pattern of movement, as a gesture; and that a gesture gradually loses its meaning for us insofar as we become aware of having witnessed it, in its total identity, before. If it is to retain this meaning in its full force, it must be on each occasion reinvested with fresh energy. Otherwise we experience it, to an increasing degree, as static; its impact, as movement, diminishes, and in the end we cease to experience it as movement at all. Its essentially static nature has imposed itself on our awareness....Each performance is a new one, and the work is always studied and approached anew, even by the composer. The same, it should be obvious, is true of professional performers. I would go even much further and point out that there is no such thing as a "definitive" performance of any work whatever.<sup>40</sup>

On the level of music performance in technology, Manfred Clynes with his sentograph, and Johan Sundberg and McAgnus Todd with their performance software and gesture-driven concepts of the final retard in music, state in particular that "the performance and perception of tempo/musical dynamics is based on an internal sense of motion." Similar approaches to cognitive models of gestures in music are shared by Marcelo Wanderley, Claude Cadoz, and Marc Leman.<sup>41</sup>

Coming from a different angle, namely music theory, the great American music theorist David Lewin introduced the gestural perspective in his seminal 1987 book,<sup>42</sup> or almost, as the theory and the textual representation are in fact more complex. Lewin's book describes what is now called "transformational theory," later adapted by his student

Henry Klumpenhouwer to become K-nets. Such networks replace an “amorphous” set of tone objects by a diagram, where the tone objects are placed in diagram’s vertices, while the diagram’s arrows designate (affine) transformations mapping tone objects into each other.

Lewin argues against what he calls “Cartesian thinking,” which observes musical objects as *res extensae*. Opposed to this passive attitude, Lewin suggests that transformations between musical points (such as pitch classes, for example) are the new path to pursue. In *Generalized Musical Intervals and Transformations*, we read: “If I am at  $s$  and wish to get to  $t$ , what characteristic gesture should I perform in order to arrive there?” Now, this language sounds very gestural, but is based on different mathematical principles. Let us clarify this subtle mathematical point, which may escape the nonprofessional. Lewin’s theory uses classical transformations and then, in Klumpenhouwer’s networks, diagrams of transformations. Diagrams are systems of transformations between a set of spaces, and they relate points in those spaces by determined transformations. But they are not identical with the point systems generated by the so-called mathematical limit construction. An intuitive, and incidentally mathematically correct, way of characterizing diagrams is as generalized equations, whereas the objects from the limits are solutions of such equations. So the diagrams play the role of industrial plants, producing facts (“factum,” what is made), namely Klumpenhouwer’s K-nets. So the Lewinian digression from Cartesian facticity (or extensionality) is the step to mathematical processes, but not to gestures.

Lewin’s formalism and his wording are different, but they show what his objective is: a gestural theory of music. It would be very interesting to investigate Lewin’s text with the subtext of gestural thinking in mind, since he repeatedly uses this metaphor in a speaking way. Relating to his question about the movement of  $s$  to  $t$ , he adds: “This attitude is by and large the attitude of someone *inside* the music, as idealized dancer and/or singer. No external observer (analyst, listener) is needed.”

This is a remarkable statement, which leads to the question set forth by music theorist Robert S. Hatten in his book with the now explicitly gesture-related title *Interpreting Musical Gestures, Topics, and Tropes*:<sup>43</sup> “Given the importance of gesture to interpretation, why do we not have a comprehensive theory of gesture in music?” For Hatten, gesturality became a core topic when he learned that performance of classical piano music—Mozart, Beethoven, Schubert—is strongly determined by gestural attitudes. This is best exemplified when comparing Glenn Gould’s interpretation of Beethoven’s op. 57 *Appassionata* with Vladimir Horowitz’s version. Gould’s performance

completely lacks gestural nature. His “analytical” reading is the opposite of what Adorno recommended, and amounts to Beethoven minus gestures, a substantial negation given the strongly gestural nature of Beethoven’s music. Hatten confirms this in theory, as does Gould by his counterfactual experiment. We may refer to *Categorical Gestures*,<sup>44</sup> in which gestural nature in Beethoven’s *Hammerklavier* sonata, op. 106, has been analyzed using a mathematical theory of gestures.

Hatten’s definition of a gesture reads as follows: “Gesture is most generally defined as communicative (whether intended or not), expressive, energetic shaping through time (including characteristic features of musicality such as beat, rhythm, timing of exchanges, contour, intensity), regardless of medium (channel) or sensory-motor source (intermodal or cross-modal).” He distinguishes his understanding of gestures from the school of Adam Kendon and David McNeill in that (i) semantic aspects are not characteristic and (ii) he stresses “energetic shaping through time,” an interesting wording, since the main subject is “shaping” an action—not the shaping of something, but pure action. The making in itself becomes a central feature, not the resulting facts generated by the making! In remarkable congruence with Wieland’s abstract geometry of gestures, he adds that: “At a higher, more symbolic cognitive level, the representation of gesture may be considered amodal, in that it is not restricted to any particular modality.” We should also recall that Cecil Taylor, the *monstre sacré* of free jazz piano, describes his approach to creative improvisation with these words: “I try to imitate on the piano the leaps in space a dancer makes.” This is a completely gestural concept, and in a documentary entitled *All the Notes* by Christopher Felver, Taylor says about score reading that deciphering those symbols takes away most of the energy for creativity.<sup>45</sup> In short, we recognize that there are numerous approaches to music and performance theory that stress the primordial role of gestures in their conception as pre-semiotic components of a deeper understanding of music.

Let us now provide a short overview of the mathematical theory of gestures that we have developed since 2002. But it is a theory of expressions that point in a complex way to gestures, those exotic “animals of human communication” that we try to understand in their dynamical behavior. It is in no way an attempt to turn gestures as such into signs. In this section, mathematical prerequisites are required, and reference to introductory texts<sup>46</sup> or the forthcoming book<sup>47</sup> is recommended. This approach is inspired by Saint Victor’s definition, but it gives it a formal shape that enables the development of an interesting concept architecture and the proof of powerful theorems. This theory was

developed as a theory of musical gestures to capture many of the problems that have been mentioned above. However, this mathematical formalism is also applicable to more general contexts of gestural utterance, such as dance and painting.

To begin with, a semiotic setup that attempts to generate a precise formalism of gestural structures is proposed. Notice that this is not an attempt to recast gestures as signs, but as entities that may be expressed as mathematical structures. In terms of Hjelmslev semiotics, this amounts to establishing a gesture semiotic  $GestSem$  that has an expressive level  $Ex(GestSem)$ , which realizes a mathematical theory of gestures, i.e., a classical system  $Ex(GestSem) = MathGest$  within the semiotic of mathematics that offers a set of “expressions” or “forms” that point to gestures, the content level  $Ct(GestSem) = Gestures$  of gestures proper. The signification level  $Sg(GestSem)$  is not restricted to any particular gesture, meaning that we may set  $Sg(GestSem) = GestSem$ . This means that the semiotics of gestures is its own signification level, that its expressive level is a mathematical theory of gestural forms, and that gestures remain closed off from metatheoretical specifications: gestures are not signs. A definition of the pointer gesture will be given below, when the formal theory is explained.

In what follows, “gestures” or “mathematical gestures” will be discussed, although the focus is on expressions that signify gestures. To define a mathematical gesture, we need a directed graph  $\Sigma$  (short form: digraph) and a topological category  $X$ . The latter is essentially a category where the category-theoretical operations are all continuous. A topological space is a special case of such an  $X$ . We turn  $X$  into a digraph  $C(X)$  by considering the space  $C(X)$  of all continuous curves, in fact continuous functors,  $c: I \rightarrow X$  on the unit interval  $I = [0,1]$ . The domain  $I$  is interpreted as a topological category, whose objects are the points  $x$  in  $I$ , and whose morphisms are the pairs  $(x, y)$  for  $x \leq y$ . The digraph’s arrows are these curves, its vertices are the objects of  $X$ , and the head and tail maps are  $h(c) = c(1)$  and  $t(c) = c(0)$ . A gesture is a digraph morphism  $g: \Sigma \rightarrow C(X)$ , where  $\Sigma$  is called  $g$ ’s *skeleton*, while  $X$  is called the gesture’s *body*. Intuitively, and realizing much of Saint Victor’s definition, a gesture is a representation of the skeleton as a configuration of curves in the gesture’s body.

A simple sign in  $GestSem$  would be the pointer  $P$ . We could set  $Ex(P): \uparrow \rightarrow C(I)$ , the map which sends the digraph  $\uparrow$  (with one arrow that connects two different points) to the identity curve  $Id: I \rightarrow I$ , we would define  $Ct(P) =$  the gesture of pointing, and finally  $Sg(P) = P$ , the self-reference. One could then also declare the middle signification level in Hjelmslev’s model to be identified with  $GestSem$ , thereby replacing the simple pointer by any gestural structure.

A first noteworthy fact is that the set  $\Sigma @ X$  of gestures with skeleton  $\Sigma$  and body  $X$  is canonically endowed with the structure of a topological category. This implies that we may now consider gestures in  $\Delta @ \Sigma @ X$ , i.e., gestures with another skeleton  $\Delta$  and their body being the topological category  $\Sigma @ X$ . These are gestures of gestures, or (mathematical) “hypergestures.” The iteration of the gestural construction is a powerful technique for constructing most complex gestural anatomies. The main result with regard to hypergestures is the Escher Theorem.<sup>48</sup>

Escher Theorem: If  $\Sigma_1, \Sigma_2, \dots, \Sigma_n$  are digraphs,  $X$  a topological category, and if  $p$  is a permutation of the set  $\{1, 2, \dots, n\}$ , then the two topological categories of hypergestures  $\Sigma_1 @ \Sigma_2 @ \dots @ \Sigma_n @ X$  and  $\Sigma_{p(1)} @ \Sigma_{p(2)} @ \dots @ \Sigma_{p(n)} @ X$  are canonically isomorphic.

This theorem looks abstract, but it has important consequences for musical creativity. Let us look at two applications:

- (i) The interaction with a fellow musician in improvisation often boils down to interpreting his/her musical utterances in a different way to create new perspectives. And in such an endeavor, the Escher Theorem helps reconsider a given hypergestural configuration from a new angle. A loop of rhythmical curves might be reinterpreted as a curve of rhythmical loops, for example. This is exactly what the Escher Theorem sets forth: it provides you with a new, albeit equivalent, perspective on what’s going on.
- (ii) The second example relates to the first species: voice against voice, of classical Fuxian counterpoint. There are two interpretations of the conjunction of *cantus firmus* with *discantus*. One reads the *discantus* voice as being the *punctus contra punctum*, the *cantus firmus* being the first voice against which the *discantus* is set. Reading this configuration as a hypergesture, the gesture of *cantus firmus* is deformed in a hypergesture to the gesture of *discantus*. This interpretation reads *contra* (counter) as being an opposition of two voices. This interpretation is often given in counterpoint courses, but it is erroneous for two reasons. To begin with, the intervals between *cantus* and *discantus* are all consonant, so there is no rationale for calling this relation a *contrapunctus*. Second, it is historically inaccurate.<sup>49</sup> The historical *contra* idea was understood as being a counterposition to successive intervals; the tension was to be built when stepping from one (consonant) interval to its (consonant) successor. *Punctus* meant interval, and it is in fact well known that contrarious movement of voices is used and preferred when building first species configurations. This second interpretation does not view the *discantus* as a deformation of the *cantus firmus*, but it considers the interval gestures as

being deformed into each other along the time axis in a hypergesture of temporal deployment. The Escher Theorem however reconciles these two interpretations as being related to each other by the isomorphism that it provides.

### **Gestural Creativity**

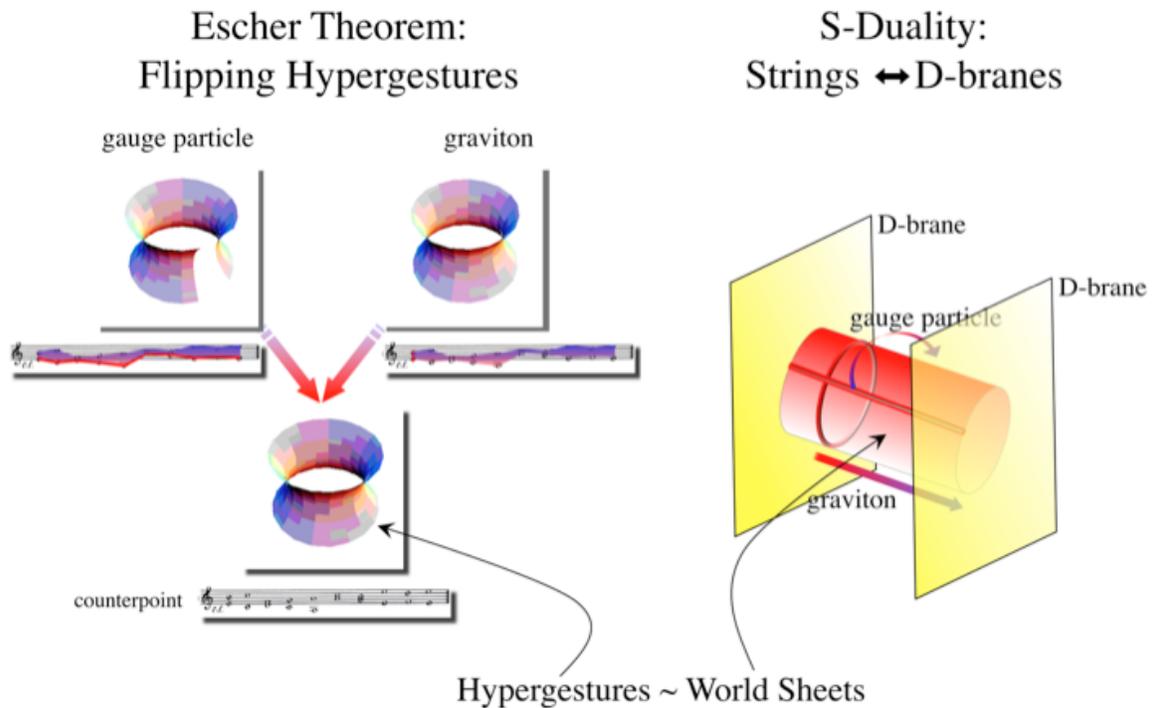
Musical creativity has always been a mysterious business since it is not only creativity as such, but moreover remains largely closed off from verbalization. Music is created in a nonverbal process. But if we look at creativity in general, it is largely pre-semiotic since it deals with opening boxes, transcending given languages and formal environments. Creativity is a semiotic generator.<sup>50</sup> Therefore, the gestural layer is quite canonical as a candidate for understanding and performing musical creativity.

In my book *Flow, Gesture, and Spaces in Free Jazz*,<sup>51</sup> I have described musical creativity in jazz, especially free jazz, using these ideas. It is about making the rules (in the sense of Charles Alunni), negotiating them in a gestural interplay, and establishing a distributed identity as a rotational movement around the axis of a distributed identity. This is what Ornette Coleman meant when he said he wanted to “play the music, not the background” in the liner notes of his famous album *Free Jazz*. He wanted to step away from the reproduction of others’ ideas, and to make music without copying a pre-established template. This is why Cecil Taylor imitates a dancer’s leaps in his creative piano universe. He does not want to imitate given forms. His aim is to express his dancing thoughts.

### **Gestures and Strings**

The softening of creative knowledge production in a gestural approach not only softens the conceptual framework, it also softens the barriers between disciplines. Soft knowledge cannot be limited by traditional disciplinary walls. This type of transgression of disciplinary limits is in fact observed in our theory of hypergestures, especially for the example of counterpoint cited above. The Escher Theorem enables an exchange of roles in hypergestural combinations. External gestural skeleta can be exchanged with internal skeleta. A loop of lines can be transformed into a line of loops. This gestural insight is in fact also observed in physical string theory, where in S-duality, strings can be reinterpreted as branes, and gauge particles as bosons.<sup>52</sup>

## Gesture Theory ~ String Theory?



Gesture Theory - String Theory? (Guerino Mazzola).

This situation is parallel to musical counterpoint, which can be interpreted as a hypergesture between *cantus firmus* and *discantus* or as a hypergesture of unfolding intervals.

This string-theory connection has been realized in a third application of mathematical gesture theory in music that relates to the investigation of the complex *transitional process between reading a score in its symbolic realm and performing it in physical reality*.<sup>53</sup> The model here represents the score data as *symbolic gestures* and the performed events as *physical gestures*, and then connects these two components by a *hypergesture* that is constructed following the Lagrangian formalism from physical string theory. This model enables a detailed analysis of the artistic potential that shapes the connection between symbolic and physical gestural utterance.

### Playing the Multiversed Game in a Pre-Semiotic Ontology

If we collect and summarize the dramatic changes in the basic conditions of Hesse's glass bead game, we can state that it has the following new features:

(a) It is played by a distributed identity of collaborators;

- (b) It is not following given rules but creates them on the spot and according to an interplay of equivalent partners, in a pre-semiotic layer;
- (c) The collaborative interplay is made by gestural exchanges, by a comprehension that does not follow templates but is built upon the repercussion of gestural dynamic;
- (d) The conceptual framework is successful in its creation of a rotational energy around the axis of a distributed identity. Success is possible and addressed, but it does not result from given criteria; it is established in a distributed harmony without the time-space invariance of traditional laws.

These characteristics redefine the glass bead game of “melting glass beads” with the following consequences:

- (a) The gestural ontology is not auxiliary or preliminary to a factual layer of reality. It has its own persistent reality that does not serve what might become the case later on;
- (b) The incessant gestural remaking of rules and concepts eliminates the world’s unicity, completing the historical suspensions of geocentricity (Copernicus), anthropocentricity (Darwin), chronocentricity (Einstein), and ratiocentricity (Turing), and adding the suspension of factocentricity;
- (c) Creativity is no longer delegated to arcane divinities; it has also become a radically human endeavor. Creation is no longer limited to God’s initial Big Bang;
- (d) The transdisciplinary parallel between music and physics shows these parallelisms: hypergestures—strings, Escher Theorem—duality, works (typically  $10_{37}$  72-element motives)—universes ( $10_{450}$  string theory landscapes), and communication via gesture interaction—Interaction via exchange of bosonic strings.

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## Footnotes

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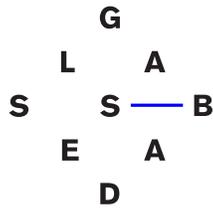
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## The Glass Bead Game Revisited: Weaving emergent dynamics with the MES methodology

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### Introduction

The Glass Bead platform aims at “navigating between heterogeneous and increasingly specialized epistemic sites” and constructing “the conditions for universal transits that transform the sites between which they operate.” It borrows its name from the Glass Bead Game (GBG) presented in the book *Magister Ludi* by Hermann Hesse<sup>1</sup> (1943) as embodying “the ideal goal of *universitas litterarum*.” The aim of this article is to discuss this reference by answering the following questions:

- (i) In which sense is the GBG “creative” and is it compatible with the Glass Bead platform’s project?
- (ii) If not, can we invent a “Revisited GBG” (RGBG) to achieve the platform’s creative objectives?
- (iii) What could we learn from such an RGBG in terms of transdisciplinary research?

#### In What Sense is the GBG “Creative”?

To study in which way the GBG is creative or not, here we use the general definition given by Margaret Boden<sup>2</sup> as follows: “Creativity is the ability to come up with ideas or artifacts that are *new, surprising and valuable*,” and refer to the three types of creativity

that she distinguishes as follows: *Combinatory creativity* “involves making unfamiliar combinations of familiar ideas ... and the ability to form links of many different types”; *Exploratory creativity* “explore(s) a structured conceptual space, mapped by a particular style”; and *Transformational creativity* means “thoughts are now possible which previously (within the untransformed space) were literally inconceivable” and “by definition, flouts some of the accepted rules.”

In the book, two more or less opposing interpretations of the GBG can be found.

*First interpretation:* “These rules, the sign language and grammar of the Game, constitute a kind of highly developed secret language drawing upon several sciences and arts ... a mode of playing with the total contents and values of our culture.”<sup>3</sup> “Stress was placed on new, bold, and original associations of themes, impeccable logic, and beautiful calligraphy.”<sup>4</sup>

*Second interpretation:* “A universal language and method for expressing all intellectual concepts and all artistic values and reducing them to a common denominator”;<sup>5</sup> “the quintessence of intellectuality and art”;<sup>6</sup> “keeping the Game ever at the summit of our entire cultural life, by incorporating into it each new achievement, each new approach,”<sup>7</sup> with, however, one constraint—that “any enrichment of the language of the Game by addition of new contents is subject to the strictest conceivable control by the directorate of the Game.”<sup>8</sup>

With the above definitions, we see that the first interpretation of the GBG leads to essentially *combinatory creativity* (“new, bold, and original associations of themes”), while the second one reflects *exploratory creativity* in the conceptual space of the whole culture (“incorporating into it each new achievement, each new approach”). As far as *transformational creativity* is concerned, there is no clear evidence of such a possibility (“addition of new contents is subject to the strictest conceivable control by the directorate of the Game”); at most, it may be possible at the border, but is unlikely. Following this analysis, it seems that albeit creative in two fecund ways (*combinatory* and *exploratory*), the GBG as described in the original book may nevertheless be limited in terms of achieving the abovementioned aims of the Glass Bead platform, which include *transformational creativity* (“universal transits that transform the sites between which they operate”). In the next section, we therefore propose to build a *Revisited GBG* (RGG) by analyzing the evolution (since 1987) of the theory of *Memory Evolutive Systems* (MES), a mathematical methodology developed by A. Ehresmann and J.-P. Vanbremeersch

(hereinafter abbreviated as EV).<sup>9</sup> This RGBG will show how the rules of the GBG could be modified to allow for innovative transdisciplinary research achieving transformational creativity, and therefore meeting the objectives of the Glass Bead platform.

### Review of Category Theory and MES

MES are based on Category Theory, a mathematical domain introduced by Eilenberg & Mac Lane in 1945.<sup>10</sup> This domain leads to ‘relational’ mathematics, in which the ‘structure’ of the objects is deduced from the relations between them. At the crossroads between mathematics, logic, and metamathematics, it reflects the main operations of the “working mathematician” (title of a book by Mac Lane, 1971, to which we refer for the main notions<sup>11</sup>) and has a unifying role in mathematics: “This theory of categories seems to be the most characteristic unifying trend in present day Mathematics” (Ehresmann, 1967).

We define a category as a (multi-)graph  $C$  on which there is given a composition of arrows which is associative and with identities; here a graph  $G$  consists of a set of objects  $A, B, \dots$ , and a set of arrows  $f: A \rightarrow B$  between them; a path of  $G$  is a sequence of successive arrows. More precisely, a category is defined as a graph  $C$  with a composition law associating to each 2-path ( $f: A \rightarrow B, g: B \rightarrow C$ ) a composite  $gf: A \rightarrow C$  satisfying: (i) each object  $A$  has an identity arrow  $id_A$  whose right or left composite with  $f$  from (or to)  $A$  is equal to  $f$ ; and (ii) the composition is associative so that each path has a unique composite whatever its 2-2 decomposition. We say that 2 paths are operationally equivalent if they have the same composite. An arrow is also called a morphism or link. Examples of categories are (i) “small categories” such as monoids, groups, posets, and categories of paths of a graph (composition = convolution), and (ii) “large categories” such as the category of sets  $Set$  and categories of (pre-)sheaves, toposes.

MES provide an integrative methodology, based on a ‘dynamic’ category theory, for the study of living systems in their ‘becoming’ and account for their main characteristics, i.e.:

- (i) Hierarchy of components varying through successive structural changes such as addition, combination and/or destruction of components;
- (ii) Multi-scale self-organization, the global dynamic weaving local operative dynamics, with the mediation of a flexible central ‘memory’ allowing for adaptation;
- (iii) Emergence of higher cognitive processes, up to consciousness, anticipation, and creativity.

The next section will show how the progressive development of MES can be retraced as a RGBG called categorification of emergence in living systems.

## Categorification of Emergence in Living Systems as a Revisited Glass Bead Game

The game is played stepwise, each step consisting of two successive processes which modify and extend the knowledge basis by addition, suppression or modification of beads:

- (i) Retrospection: Recall of ‘beads’ in the existing knowledge basis in relation with specific characteristics of living systems. It is played by gathering different authors’ quotes about them.
- (ii) Prospection-complexification: Creation of adapted categorical notions which become new ‘beads’ representing a mathematical model of the characteristics.

The following table summarizes the successive steps with, on the left, characteristics of the living system recalled from the knowledge basis, and, on the right, name(s) of new beads transferring this knowledge into categorical notions.

Living systems	‘Beads’	Categorical notions
Whole $\neq$ sum of parts Hierarchy of holons		Complex object as a colimit Hierarchical category
Becoming-in-action: Standard changes. Information transfers		Time in MES: Transitions Complexification process
Degeneracy property => Emergence of complexity		MP: Multifaceted components Emergence Theorem
Multi-agent organization Increasing knowledge		CRs' landscapes and interplay. Memory
Neuro-cognitive system 'Self' memory. 1st person		Model MENS Archetypal Core. Macrolandscape
Higher cognitive processes (Transformational) Creativity		Retrospection/Prospection Iterated Complexification Theorem

 Time

### Bead 1: Hierarchical Category

1. “A system is a set of units with relationship between them.”<sup>12</sup> The configuration of the system at an instant  $t$  is modeled by a category  $H_t$ : an object represents the state of a component at  $t$ , the morphisms represent the relationships between components.
2. “The whole is something else than the sum of its parts” (Aristotle). In  $H_t$  the complex “whole” is represented by an object  $C$  which ‘combines’ a pattern (or diagram)  $P$  of linked objects  $P_i$  representing a decomposition of  $C$ , so that  $C$  has the same operational role as  $P$

acting collectively.  $C$  is modeled by the colimit<sup>13</sup> of  $P$  in  $H_t$ .

3. “*Tout objet que considère la Biologie représente un système de systèmes; lui-même élément d’un système d’ordre supérieur.*”<sup>14</sup> To account for components of a living system with different complexity levels (atoms, molecules, cells, etc.), we introduce (see EV) the notion of a *hierarchical category*, i.e., a category whose objects are attributed an integer, called its *complexity level*, with the property: an object  $C$  of level  $n+1$  is the colimit of at least one pattern  $P$  of linked objects of levels  $\leq n$  through which it can operate.

4. Koestler<sup>15</sup> proposes the word *holon* to describe the “hybrid” nature of the components of living systems, comparing them to “two-faced Janus.” In a hierarchical category  $H_t$  an object  $C$  of level  $n+1$  has such a “Janus” nature: it is “simple” with respect to levels  $> n+1$ , “complex” with respect to levels  $\leq n$ . Then  $C$  admits at least one *ramification* down to level 0 (see Figures 1 and 2); its *complexity order* is the smallest length of its ramifications.

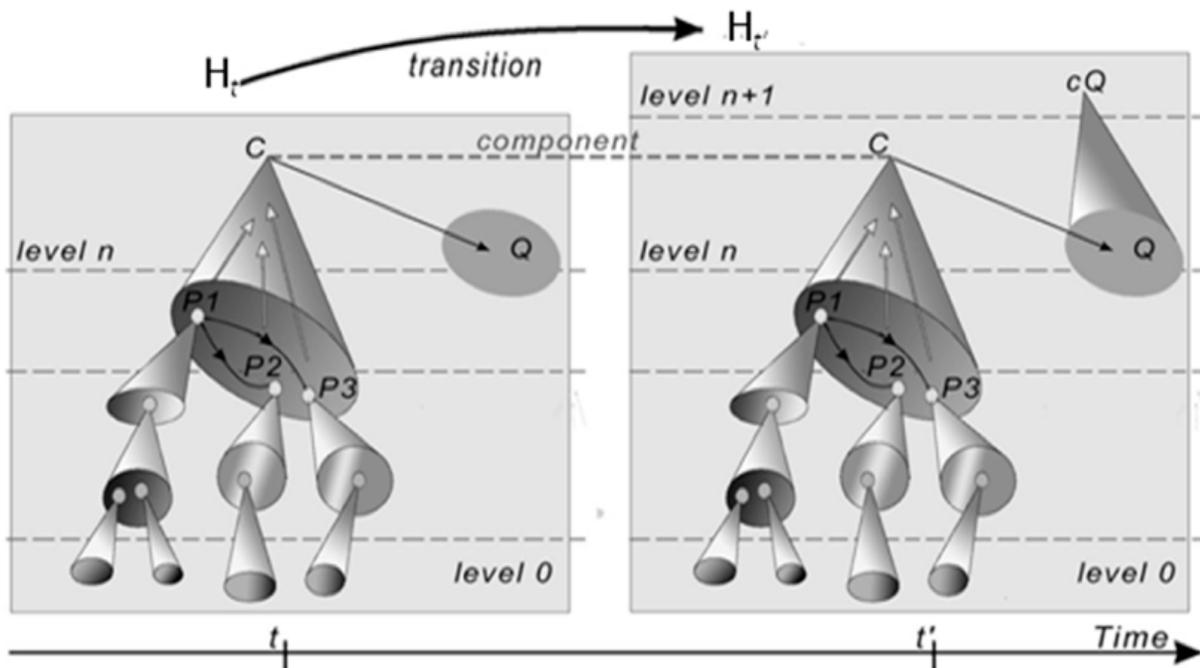


Figure 1. Hierarchical Evolutive System, with a ramification of  $C$

## Bead 2: The Role of Time — Hierarchical Evolutive System. Complexification Process

1. “*La Dynamique, entendue au sens le plus général de science des actions du temps dans les états d’un système*”<sup>16</sup> To model the possible addition/suppression of components over time, we introduce the notion of a (Hierarchical) Evolutive System (see EV): a (H)ES  $H$  consists of: (i) the family  $(Ht)t$  of the (hierarchical) configuration categories of the system, indexed by its timescale Time; and (ii) for each  $t < t'$ , a functor, transition, from a subcategory of  $Ht$  to  $Ht'$  measuring the change. These transitions respect a transitivity

condition so that a *component* of the (H)ES is a maximal family of objects (its successive states) connected by transitions; similarly a *link* between components is a family of transition-connected morphisms. A link has a *propagation delay* and is *active* (meaning: transferring information) or not at  $t$ .

2. Thom distinguishes four “archetypal singularities”: Birth, Death, Scission, Confluence.<sup>17</sup> In a HES, these structural changes become: ‘adding’ a set A of external elements; ‘suppressing’ or ‘decomposing’ a set S of components; and given a set  $\Pi$  of patterns, combining the linked components of each P in  $\Pi$  by ‘adding’ a colimit  $c_P$  to P. Given a procedure Pr on Ht with objectives of these kinds, we construct a category, called the *complexification*<sup>18</sup> of Ht for Pr, in which these objectives are ‘optimally’ satisfied; it is explicitly constructed by induction (see EV). The transitions are generated by *complexification processes*.

### Bead 3: Multifaceted Components. Emergence Theorem

1. “Degeneracy, the ability of elements that are structurally different to perform the same function or yield the same output, is a ubiquitous biological property ... a feature of complexity.”<sup>19</sup> In a HES, degeneracy is modeled by the Multiplicity Principle (MP) which ensures the existence of n-multifaceted components, where a component C is n-multifaceted if it is the colimit of at least 2 patterns P and Q of levels  $\leq n$  which are structurally different and not connected<sup>20</sup> by a cluster of links (see Figure 2). Thus, at a given time, C can operate through any one of them and switch between them, up to its own destruction.

2. “A composite Individual can be affected in many ways and still preserve its nature.”<sup>21</sup> In a HES, a component C is a dynamic system which preserves its own individuation over time independent from its lower structure (e.g., a cell keeps its identity though renewing its molecules in time). C can operate through different ramifications, losing some of them and/or acquiring new ones.

3. Popper insists on the role of “change in the conditions of change.”<sup>22</sup> A consequence of MP is the possible emergence, through complexifications, of composites of *simple links*<sup>23</sup> which bind nonadjacent clusters separated by a switch (see Figure 2) and are not simple. Such *complex links* represent *emergent properties* at a level  $n+1$ , not observable at levels  $\leq n$ , although dependent on their global structure; they allow for “change in the conditions of change.”

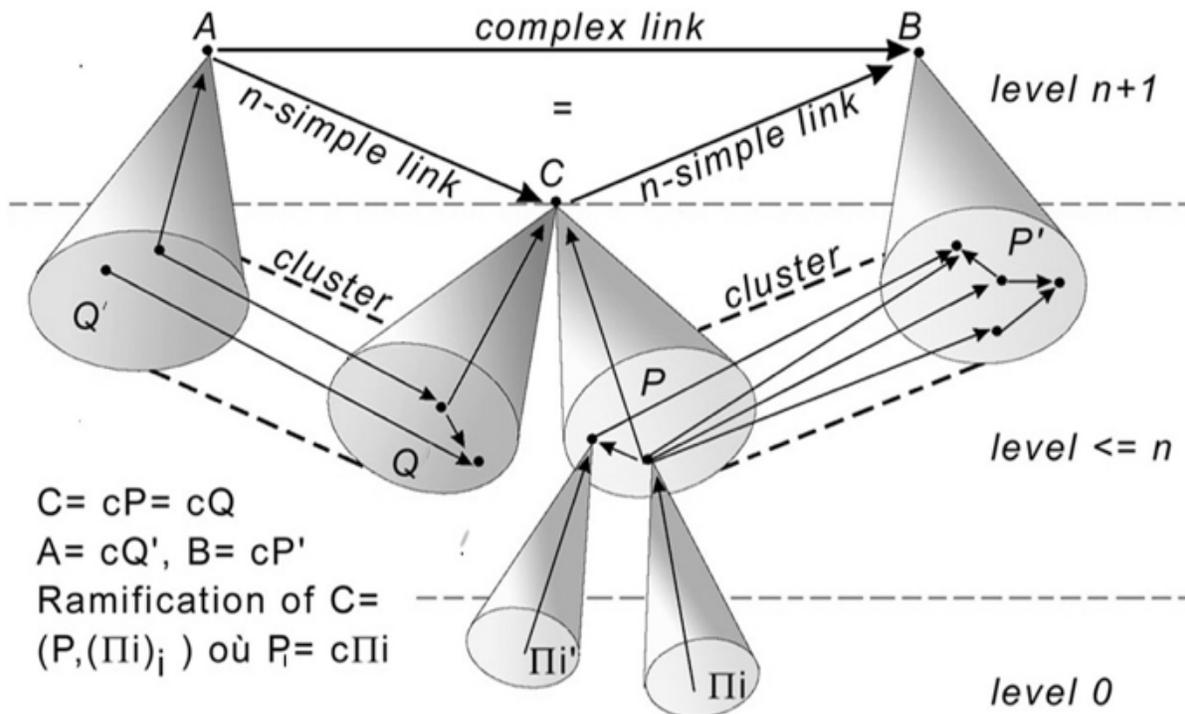


Figure 2: Simple and complex links

**Emergence Theorem.**<sup>24</sup> *If MP is satisfied, a complexification also satisfies MP and it can lead to the formation of multifaceted components of higher complexity orders and to the emergence of complex links between them.*

**Iterated Complexification Theorem.**<sup>25</sup> *A complexification of a complexification of Ht in which complex links play a role cannot be reduced to a unique complexification of Ht.*

#### Bead 4: MES as a Cognitive Multi-Agent System

1. *“Memory, as a constraint holding over events of the past and the present and a relation between them”* (Ashby<sup>26</sup>). A MES is a HES with a ‘memory’ storing knowledge of various kinds for better adaptation to its environment. This memory is represented by a sub-HES Mem which develops over time by formation of multifaceted components of increasing complexity order; this development is a consequence of the Emergence Theorem, which, thanks to MP, also implies that the memory is both robust and flexible.

2. *“Les agents n’ont qu’une représentation partielle de leur environnement, c’est-à-dire qu’ils n’ont pas de vision globale de tout ce qui se passe.”*<sup>27</sup> A MES also has a network of internal agents, called *co-regulators*, and its overall dynamic weaves their different internal local dynamics. A co-regulator (CR) is a sub-ES with its own function, complexity, and rhythm, which acts stepwise with the help of the memory. At a step from t to t’, it only accesses partial information through the active links arriving to its components during this step;

they form an evolutive system called its *landscape*  $L$  at  $t$ . An admissible procedure  $Pr$  is selected on  $L$  (using  $Mem$ ) and realized by a dynamic process during the step. The result is evaluated at  $t'$ : there is a *fracture* for  $CR$  if the expected result is not attained.

3. “Ability of agents to autonomously plan and pursue their actions and goals, to cooperate, to coordinate, and negotiate with others” (Wooldridge & Jennings<sup>28</sup>). The global dynamic results from interplay among the co-regulators to harmonize their different procedures, with risk of fractures for some co-regulators.

#### Bead 5: MENS—An Integrative Model of the Neuro-Cognitive System

1. Hebb shows that a mental object activates a *synchronous assembly of neurons*.<sup>29</sup> This assembly is not unique because of the *degeneracy of the neural code*.<sup>30</sup> A MENS is a MES whose level 0 components represent neurons (with their activity) while a higher level component, called *cat(egory)-neuron*, models a more or less complex mental object  $M$  constructed as the colimit  $cP = cP'$  of the different synchronous assemblies of (cat-)neurons  $P, P'$  activated by  $M$ . Formally, a MENS is obtained through successive complexifications of the *Evolutive System of Neurons* (NEUR) whose links represent synaptic paths between neurons (with their propagation delay and strength at  $t$ ). The degeneracy of the neural code implies that MENS satisfies  $MP$ .

2. “Existence of a Structural Core in human cerebral cortex, both spatially and topologically central ... linked to self-referential processing and consciousness.”<sup>31</sup> In time the memory of MENS develops a strongly connected sub-ES, called the *Archetypal Core* (AC), whose components are higher order multifaceted cat-neurons with many ramifications having their base in the Structural Core; they are linked by strong and fast complex links which form *archetypal loops* self-maintaining their activation for a long time. Archetypal records integrate significant memories of different modalities; they self-maintain their activation for some time through archetypal loops and diffuse it to lower levels by the unfolding of ramifications. AC represents the “Self” and acts as a motor in the formation of higher cognitive processes.

3. “The physical bases of conscious states consist of spatially dispersed, but re-entrantly interconnected, neuronal groups in a widely distributed set of brain areas.”<sup>32</sup> The co-regulators of MENS are sub-ES based on specialized brain modules. Among them, we distinguish *intentional co-regulators* which are co-regulators directly linked to AC, whose components are of higher complexity order and have ramifications based on associative brain areas (cf. Crick’s “conscious units”<sup>33</sup>). These co-regulators and the links between their components act as a macro-co-regulator *Int*, in particular to form a landscape, called a *macro-landscape*.

## Bead 6: Higher Cognitive Processes. Consciousness. Creativity

1. “Conscious processes arise spontaneously and display intentionality, i.e., for the most part, each is about something.”<sup>34</sup> An unexpected or striking event or problem *S* activates part of AC. The activation diffuses in AC via archetypal loops and propagates to different levels, down to lower levels through the unfolding of ramifications and switches between them. Transmitted back to *Int*, it leads to the formation of a long term macro-landscape (ML).

2. “*Il y a dans le présent une rétention du passé et une protention du futur (de ce qui va immédiatement arriver).*”<sup>35</sup> ML unites and extends spatially and temporally the landscapes of the intentional co-regulators through exchanges between them. As archetypal loops are self-maintained, ML persists for a long time. Due to the activation delays, links coming from lower levels can transmit information of just-passed events, including ‘non-conscious’ information (about instinctive motor or perceptive behaviors, emotions and affects, reflexes,...), allowing ML to support embodied cognition.

3. Creativity as “a process of discovery and invention that begins with an open question and continues with a run through a sequence of well-defined operational steps.”<sup>36</sup>

ML gives a space for the development of higher conscious mental or cognitive processes, up to consciousness, creativity and anticipation, through the iteration of the overlapping processes:

(i) *Retrospection*, i.e., in ML, analysis of the situation and recall of the near past for, with the help of the memory, “making sense” of the present situation (by abduction), its trends and future potential;

(ii) *Prospection*, i.e., the construction of ‘virtual’ landscapes (“mental spaces”) in ML in which sequences of procedures are tried and ‘virtually’ evaluated with the help of the memory;

(iii) *Complexification* for the selected procedure(s).

A particular case is the RPC-method for creativity<sup>37</sup> which characterizes transformational creativity by iteration of complexifications where emergent complex links introduce rules for changing the rules, which must be slowly integrated.

## Discussion and Conclusion: Characteristics of the Revisited GBG

Playing a GBG can be interpreted as the evolution of a particular MES. The components are: those interested in the game, especially players and the judges (who act as co-regulators); and the Archives of the game, in particular the hierarchy of beads, which represent the Memory. The game combines patterns of already existing glass beads from

different domains, forming colimits named by the corresponding hieroglyphs. However, as we have seen, to develop higher order memory, the system should satisfy the multiplicity principle, meaning beads should not be rigid (as 'glass') but flexible and multifaceted in order to adapt to changes; moreover, transformational creativity would require the possibility of new rules changing the rules.

### The Case of Hesse's Glass Bead Game

In Hesse's work, a basic assumption is that there exists a "large category" (a topos?) TOT representing the whole of knowledge, values and culture, and the Game takes place within it. The players only know a part H of TOT through their landscape L, and the aim of the game is to extend H by discovering more of the structure of TOT.

Thus, the Game remains inside of TOT. A GBG consists in exploring H, selecting a procedure Pr on it (through L) and constructing the complexification C of L for Pr. As the category TOT is cocomplete (meaning any pattern has a colimit in TOT), the 'difference' functor  $\text{Diff}: L \rightarrow \text{TOT}$  extends to C (universal property of the complexification), and the image H' of C in TOT reduces to a Pr-complexification of H internally to TOT. The players' new landscape reflects H.'

These operations allow for combinatory or exploratory creativity since the complexification process 'combines' the Pr-specified patterns; and the selection of Pr leads to an exploration of mental spaces. They do not lead to transformational creativity because this would require "change in the conditions of change," i.e., the formation of new complex links in successive complexifications (Iterated Complexification Theorem, Section II). However, the image of a complex link appearing in C already exists in the cocomplete category TOT, and hence in its image H' in TOT, so that it does not lead to further change in a later complexification.

### A Revisited GBG Can Attain Transformational Creativity

The RGBG played in Section II does not suppose the existence of TOT. Instead, it supposes there is real 'evolution' of the knowledge base (memory) over time, with addition/suppression of new knowledge. It can therefore lead to transformational creativity if the associated MES satisfies MP. Whence we arrive at the characteristics to be added to the Glass Bead Game in order for it to attain transformational creativity.

Theorem. The revisited GBG may lead to transformational creativity if it includes the following changes:

1. The beads should be multifaceted to allow for flexibility and ‘real’ emergence (MP).
2. They should be destructible (suppression of no more valid knowledge).
3. Rules “for changing the rules” (complex links) should be accepted.

With these modifications, the Game could cover the aims of the Glass Bead platform and lead to innovative transdisciplinary research.

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## Footnotes

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13. A *pattern* in  $H_t$  is a family of objects  $P_i$  connected by distinguished morphisms  $f: P_i \rightarrow P_j$ . A *cone* from  $P$  to an object  $A$  of  $H_t$  is a family of morphisms  $s_i: P_i \rightarrow A$  such that  $s_i = s_j f$  for each  $f: P_i \rightarrow P_j$ .  $cP = \text{colimit of } P$  if there is a *colimit-cone*  $(c)_i$  from  $P$  to  $cP$  such that, for each cone  $(s)_i$  from  $P$  to  $A$  there is a one and only one morphism  $s: cP \rightarrow A$  such that  $s_i = s c_i$  for each  $i$ .
14. “Each object considered in biology represents a system of systems, itself an element of a higher order system.” François Jacob. *La logique du vivant*. Paris: Gallimard, 1970. 326. Print.
15. Arthur Koestler. *Le cri d'Archimède*, Paris: Calmann-Lévy, 1965. 452. Print.

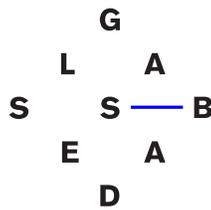
16. “Dynamics, taken in the most general sense of science of the actions of time on the states of a system.” René Thom. *Modèles Mathématiques de la Morphogenèse*. 10/18 collection. Paris: Union Générale d’Edition, 1974. Print.
17. René Thom. *Esquisse d’une Sémiophysique*. Paris: InterEditions, 1988. 57. Print.
18. The *complexification*  $H'$  or  $H_t$  for  $Pr$  is the ‘universal solution’ of the problem: to construct a category  $H'$  and a functor  $F$  from a sub-category  $K$  of  $H_t$  to  $H'$  such that: (i)  $K$  contains  $A$  and does not contain  $S$ ; and (ii) for each  $P$  in  $\Pi$  the pattern  $FP$  image of  $P$  by  $F$  admits a colimit  $cP$  in  $H'$ ; if  $P$  has a colimit in  $H_t$ ,  $cP$  is the image of this colimit by  $F$ ; otherwise  $cP$  ‘emerges’ in  $H'$  to become the colimit of  $FP$ . For the explicit construction of  $H'$ , see EV.
19. Gérald M. Edelman and Joseph A. Gally. “Degeneracy and Complexity in Biological Systems.” *Proc. Natl. Acad. Sci. USA* Vol. 98 Nov. 2001, 13763-13768. Print.
20. In a category, two patterns with the same colimit  $M$  are *structurally non-connected* if they are not isomorphic and there is no cluster between them binding into the identity of  $M$ ; then  $M$  is *multifaceted*.
21. Benedict de Spinoza. *The Ethics*. 1677. Trans. R. H. M. Elwes. Web.
22. Karl Popper. *The Poverty of Historicism*. London: Routledge Classics, 1959. 176. Print.
23. If  $P$  and  $P'$  are patterns having respectively colimits  $C$  and  $B$ , a cluster  $G$  from  $P$  to  $P'$  binds into a unique morphism  $cG$  from  $C$  to  $B$ , called a  $(P, P')$ -*simple link*, or *n-simple link* if  $P$  and  $P'$  are of levels  $\leq n$ . An *n-complex link* is a morphism which is not *n-simple* though it is the composite of *n-simple* links binding non-adjacent clusters separated by a switch (see Figure 2 and EV.)
24. Andrée Ehresmann and Jean-Paul Vanbremeersch. *Memory Evolutive Systems; Hierarchy, Emergence, Cognition*. London: Elsevier, 2007. Chapter IV: 402. Print.
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26. W. Ashby. “Principles of the Self-Organizing System.” *Principles of Self-Organization: Transactions of the University of Illinois Symposium*. Eds. Heinz Von Foerster and George W. Zopf, Jr. Pergamon: London, 1962. 225-268. Print.
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28. Michael Wooldridge and Nicholas R. Jennings. “Intelligent Agents: Theory and Practice.” *Knowledge Engineering Review* Vol.10 No. 2 June 1995: 115-152. Print.
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33. See the notion of “conscious units” in Francis Crick. *The Astonishing Hypothesis: The Scientific Search for the Soul*. New York: Macmillan Publishing Company, 1994. Print.
34. Franz Brentano. *Psychology from an Empirical Standpoint*. 1874. Trans. T. Rancurello, D. Terrell, and L. McAllister. New York: Humanities Press, 1973. Print.
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## Transcendental Logic and True Representings

Ray Brassier

The task of “transcendental logic” is to explicate the concept of a mind that gains knowledge of the world of which it is a part. The acquisition of knowledge by such a mind involves its being acted on or “affected” by the objects it knows.<sup>1</sup>

Sellars’s characterization of transcendental logic presupposes his commitment to transcendental naturalism. Transcendental naturalism seeks to identify the general features any conceptual system must possess in order to know the nature of which it is a part. It is bound by a minimal constraint of immanence: the mind’s immanence to nature. Our minds are a part of nature. But what ‘nature’ is and what ‘minds’ are is not yet fully determined. The constraint of immanence has the following consequence: if our minds are a part of nature, then what we know about our own minds cannot differ fundamentally in kind from what we know about other parts of nature. We will see later that this has interesting ramifications for understanding the appeal to ‘immanence’ by many contemporary philosophers.

Understanding exactly *how* known objects “act upon” or “affect” the knowing mind is the fundamental problem. Although the mind is embedded in nature, it is not a mirror of nature. Sellars’s rejection of the myth of the categorial given—the belief that the categorial structure of reality imprints itself upon the mind as a seal imprints itself on wax—means rejecting the presumption of a preestablished harmony between knowing mind and known world. This is effectively to rule out intellectual intuition as a means of accessing the fundamental structure of reality. Human understanding is discursive, not intuitive. Its medium is what Kant called judgment and what Brandom calls assertion, which always stands in a variety of justificatory relations to other judgments or

assertions. To characterize a creature as minded is not to give an empirical description of it but to recognize it as capable of participating in the game of giving and asking for reasons.

The converse of the claim that human understanding is discursive is the claim that human intuition is sensible, not intellectual. To say that our intuition is sensible is to say that our discursive understanding of nature as the totality of objects existing in space and time is conditioned by the way nature appears to us in both space and time. This is the problem of representation, first formulated by Kant. If nature is cognizable to the extent that it is representable, then nature is the system of true representations or actual states of affairs. But as Sellars points out, “[N]ot every system of empirical representables constitutes nature, but only that system of empirical representables, the representings of which would be true.”<sup>2</sup> Transcendental logic aims to uncover both what it is for something to be an “empirical representable” and what it is for something to be a “true representing.” Understanding the former involves grasping the way in which conception interacts with sensation. Understanding the latter requires grasping the nature of the connection between truth pertaining to what is conceptually *represented*, and truth pertaining to nonconceptual *representings*. In Kantian parlance, this is the question of the relation between understanding and sensibility. However, it cannot be reduced to the bald contrast between concepts and intuitions, for part of Sellars’s revision of Kant involves extending the reach of the concept to intuition and acknowledging the indispensable role of *conceptual intuition*, whose operation is aligned with yet fundamentally distinct from that of nonconceptual sense-impressions. As we shall see, the latter are postulated in accordance with the requirements of transcendental logic to explain how conceptual intuition is guided by nonconceptual factors.

### Intuition and Sensibility

The distinction between representing and represented is not the difference between two separate things but the formal (or transcendental) distinction between the reality of a thing insofar as it is represented and the reality of a thing independently of its being represented. This is the distinction between objective reality—reality immanent to the represented—and reality *an sich* (in itself), i.e., non-represented reality.

In Sellars’s naturalistic revision of Kantianism, the distinction between represented and non-represented is contained within the immanent distinction between representing and represented. Thus four things need to be distinguished:<sup>3</sup>

- Non-representings in themselves

- Represented non-representings
- Representings in themselves
- Represented representings

But as there are two types of representings, conceptual and nonconceptual, we must also distinguish between:<sup>4</sup>

- Conceptual representings in themselves
- Conceptual represented
- Nonconceptual representings in themselves
- Nonconceptual represented

However, the distinction between conceptual and nonconceptual representings does not map on to the orthodox distinction between concepts and intuitions. It turns out that intuitions have conceptual form. Thus the relevant contrast is between intuition and sensibility. Intuition turns out to be conceptually informed, but conceptual intuition is determined by the nonconceptual structure of sensibility.

On the traditional account, intuitions deliver particulars which are perceived as being thus and so. Consider the following perceptual report:

I see this as a red rectangular brick

The traditional view maintains that my beliefs about the brick are distinct from my seeing the brick:

I see this *as* a red rectangular brick and I believe *that* this a brick with a red and rectangular facing surface

Here we have a distinction between intuitive perceptual taking, or “seeing as,” and belief proper, which has propositional form. My seeing this as being thus and so and my belief that it is (or is not) thus and so are distinct, with the latter presupposing the former.

This traditional account falls prey to the myth of the categorial given: the assumption that to be aware of X is to be aware of it *as* X. In this version, the myth fuses thinking and sensing: it assumes that things present themselves to sensory consciousness already endowed with categorial form. We sense something as something before superimposing onto it our belief that it is thus and so:

I see this as a red rectangular brick and I believe it is too big for the job at hand

What is wrong here is the assumption that objects cause us to be in certain sensory states, and these sensory states are already endowed with the categorial form that allows them to play a justificatory role in empirical knowledge. The object causes me to see it as what it is and this justifies my subsequent beliefs about it and its relations to other objects. Causation and justification are illegitimately fused. By separating them, we distinguish between the sensory states which objects cause perceivers to be in, and the

perceptual states in terms of which perceivers respond to their sensory states. In order for these perceptual responses to play a justificatory role in empirical knowledge they must already be endowed with categorial form: they must be *seeings as* (or *hearings as*, *tastings as*, *touchings as*, *smellings as*). This is to say that they must involve categorially formed conceptual intuitions of sensible particulars. Once we acknowledge the fundamental role of conceptual intuition in empirical perception, we can subsequently distinguish between what we see *of* objects, and what we see objects *as*. What we see *of* an empirical object is a function of our embodied, perspectival relation to it; but this perspectival relation already presupposes the conceptual intuition of the object *as* something thus and so. What is intuited is never a bare particular; rather, it is a condition of our ability to intuit particulars that they be conceptually intuited as something. In the following passage, Sellars explains why conceptual intuition is an epistemically irreducible type of representation:

Consider the statements

This is a pyramid

This pyramid is made of stone

The first has the explicit grammatical form of a sentence.

So does the second. But notice that the grammatical form of a sentence is lurking in the subject of the second sentence.

From the standpoint of transformational grammar we would think of it as derived from the deep structure

This is a pyramid and it is made of stone

One might be tempted to think of 'this' as a pure demonstrative having no other conceptual content than that involved in being a demonstrative. Kant *does* think of an act of intuition as a demonstrative thought, a Mentalese 'this.' However he does not think of this Mentalese demonstrative as a *bare* Mentalese 'this.' An example of an act of intuition would be the Mentalese counterpart of

This cube facing me edgewise

where this is *not* to be understood as, so to speak, a Mentalese *paraphrase* of

This is a cube which faces me edgewise

The role of an intuition is a basic and important one. It is the role of bringing a particular object before the mind for its consideration. Thus, though there is a close relationship between

This cube facing me edgewise . . .

and

This is a cube which faces me edgewise.

the former is an *irreducible* kind of representation. It is a demonstrative representation which has conceptual content and grammatical form. As noted above it contains the form and content of the judgment “This is a cube.” Thus for Kant intuitions are complex demonstrative thoughts which have implicit grammatical (and hence *categorical*) form.<sup>5</sup> Intuitions are conceptually formed ‘this-suches’: “this cube facing me edgewise,” “this stone pyramid,” etc. To say that conceptual intuitions are irreducible representations is to say that they provide the fundamental data for perceptual experience and that they deliver the ultimate subjects of predication for empirical judgments.<sup>6</sup> It is because intuitions are representations endowed with conceptual content and grammatical form that they can play this fundamental role in empirical knowledge. Thus perception cannot be decomposed into the sensing of bare particulars coupled with propositionally structured beliefs *about* those bare particulars. What is intuited is categorially determined and thus already available for propositionally structured belief.

But how do intuitions relate to sensibility, or what Sellars calls “sense-impressions”? Our perceptual reports are primarily about physical objects; they are not about not the sensory states caused by those objects and responded to by our reports. We perceive physical objects as thus and so and we deliver perceptual reports about those objects, although those reports are in part responses to the sensory states caused by those physical objects. It is important to realize that our perceptual vocabulary is developed in response to the perceptible characteristics of publically accessible physical objects and that we first have to master that vocabulary before we subsequently learn to deploy it to make perceptual reports about our own sensory states. The ability to perceive our own sensations presupposes the ability to perceive publically accessible objects. Thus the properties of sense-impressions are the postulated counterparts of the properties of physical objects, but counterparts whose properties are modifications of their models: the sense-impression of a red rectangle can be described as a “red rectangular impression” even though it is understood that strictly speaking the sensation itself is neither red nor rectangular. ‘Redness’ and ‘rectangularity’ are the models for the properties of the representing (the sensing) through which they are represented as the properties of intuited particulars (e.g., this red rectangular brick). These counterpart properties are the properties of nonconceptual representings, or sense-impressions. Sellars’s account of conceptual intuition lets us see how intuited perceptual content, i.e., that which is empirically represented, is conditioned by the forms of intuition, i.e., by space and time as forms of what is conceptually represented (which is not to equate

space and time with concepts of the understanding), as well as by the forms of sensibility, i.e., the nonconceptual representings whose spatiotemporal structure is analogous to but categorially distinct from intuited space and time. Thus Sellars distinguishes between space and time as forms of conceptual intuition and their theoretical counterparts, the sigma and tau dimensions as the forms of sensory, i.e., nonconceptual, representings.<sup>7</sup> Crucially, it is these nonconceptual forms that guide true representings. Thus truth at the level of represented content is anchored in something akin to truth, which Sellars calls “correct picturing,” at the level of nonconceptual representing. But how does nonconceptual form condition conceptual content, which is to say, meaning? In order to understand, we must first get clear about Sellars’s ‘non-relational’ theory of meaning.

### Meaning and Picturing

Meaning statements such as

‘Le chat est sur le paillason’ (in French) means *the cat is on the mat* (in English) are taken to be informative insofar as the English sentence “the cat is on the mat” means what it does because it expresses the nonlinguistic thought or proposition that *the cat is on the mat*. But for Sellars, meaning statements do not correlate linguistic items with nonlinguistic items (‘meanings’ understood as nonlinguistic entities, whether thoughts, propositions, or states of affairs). Rather, they correlate the linguistic function of an item in an unfamiliar language with that of a linguistic item in a familiar language—in this case, a sentence saying *that p*. Meaning statements such as:

‘Rouge’ (in French) means *red* (in English)

correlate linguistic items across two different languages by saying that they play an equivalent role in the two languages

‘Rouge’ in French is a ●red● in English

says that the mentioned sign design plays the same linguistic role in French as “red’ does in English. ‘Red’ here is not being mentioned but used in a special way: not as it is ordinarily used in English (as meaning the color red) but as an illustrating sortal in a metalinguistic assertion.

Similarly, in statements such as

a ‘rouge’ is a ●red●

a ‘triangulaire’ is a ●triangular●

‘rouge’ and ‘triangulaire’ function as *distributive singular terms* rather than abstract nouns.

Sellars's crucial contention is that metalinguistic properties picture nonlinguistic properties via the syntactical configuration of sign-design tokens. This link between metalinguistic form and nonlinguistic structure is utterly decisive for Sellars. It provides him with a way of dispensing with appeals to abstract entities in accounting for meaning. He does this by reconstructing the semantic role played by relational expressions and empirical predicates without hypostatizing them as abstract entities.

In accounting for relational expressions, Sellars's chief inspiration is Wittgenstein's claim in the *Tractatus* that we say *that aRb* by placing the names 'a' and 'b' in a certain dyadic relation. This dyadic relation is a pattern of inscription. It is the inscription that shows how a and b are related by inserting the symbol 'R' between the names 'a' and 'b'. But the relation itself is not an object. And the token 'R' that relates a and b is not a name. Thus what 'R' does in the statement 'aRb' could be done without using a symbol. Consider the statement "a is larger than b." We could adopt a convention whereby the graphic properties of the inscriptions 'a' and 'b' say what the statement "a is larger than b" says. For example:

a  
b

This inscription states what "a is larger than b" states without using the expression "is larger than." But it is crucial to note that nothing in the above inscription plays the role (allegedly) played by "is larger than." That b is below a is essential to the meaning of this statement. But this graphic feature does not correspond to the role played by the expression "is larger than." Rather, in the inscription above, b's being below a plays the role played by a and b having "is larger than" between them. Thus both the "is larger than" and b's being below a are functioning here as inscriptions, which is to say graphic objects, rather than as signifying expressions. This insight extends to the semantic role played by empirical predicates. The statement "x is red," which means that object x has the property red, could be written **x**. Here it is the way in which the name 'x' is inscribed that tells us what property the object x has. The inscription **x** has two relevant features: it features a token of the name 'x' which refers to object x, and it has a specific graphic characteristic, i.e., being inscribed in bold type. Fundamentally, Sellars's claim is that predicates do not play an independent role within linguistic expressions: "Not only are predicative expressions dispensable, the very function played by predicates is dispensable."<sup>8</sup> Consequently it is a mistake to abstract the role played by predicates from the role of the expressions in which they occur. It is this abstraction of a fragment of function that encourages the mistaken idea that predicates designate conceptual

properties or metaphysical attributes. The predicative role should not be reified and turned into an abstract entity called a ‘property’ that exists independently of sentential contexts. Still less should the conceptual property supposedly expressed by the predicate be hypostatized and turned into an ontological attribute that exists not only independently of language—as conceptual properties are alleged to—but independently of thought. As Sellars asserts: “[T]he extra-linguistic domain consists of objects, not facts. To put it bluntly, propositional form belongs only in the linguistic and conceptual orders.”<sup>9</sup> The philosophically decisive consequence is the following: conceptual functions are linguistically incarnated in sign-designs whose material characteristics picture objects as being somehow. This ‘somehowness’ is *shown* not said by the manner in which names are uttered or inscribed.

An utterance or inscription by itself is of course not a statement. It is a physical pattern (phonemic, graphic, or gestural). Sellars’s naturalism requires that although semantic function is logically irreducible to causal function, it is causally dependent upon it. In other words, semantic function is inoperative independently of its physical incarnation. Thus rule-governed conceptual activity, i.e., thinking, is embodied in pattern-governed regularities, i.e., physical behaviors (whether or not this embodiment is necessary, and the precise nature of its necessity are questions we cannot pursue here). Hence Sellars’s “norm-nature meta-principle,” according to which “espousal of principles is reflected in uniformities of performance.”<sup>10</sup> But crucially picturing itself is not a semantic relation or function. It is a “second-order isomorphism” between objects in the natural order. It does not consist in a relation of resemblance between representation and represented; it consists in the structural equivalence between properties of relations among representations considered as natural objects and properties among represented objects. Sellars’s suggestion is that conceptual properties do not designate attributes or ways of being but are nevertheless rooted in acts of representing that picture reality in ways that can be said *from within the conceptual order* to be more or less adequate.

### Mapping I

Thus concepts do not represent, but conceptual function is embedded within a representational function through which representational systems map the worlds they inhabit. In other words, the roles of conceptual categories are embedded in and conditioned by the mapping function. Sellars illustrates this in his account of “robot picturing” in “Being and Being Known.”<sup>11</sup> The robot’s wiring diagram determines

transformations from sentences to other sentences in accordance with mathematical and logical principles. In addition, it must also contain the equivalent of inductive generalization such that if its tape contains sentences pairs like

Lightning at  $p$ ,  $t$  thunder at  $p+\Delta p$ ,  $t +\Delta t$

And no sentences pairs like

Lightning at  $p$ ,  $t$  peace at  $p+\Delta p$ ,  $t +\Delta t$

Then it prints sentences such as

Whenever lightning at  $p,t$ , thunder at  $p +\Delta p$ ,  $t +\Delta t$

In the conceptual order, which Sellars calls the order of signification, the tape pattern ‘::’ signifies lightning and the pattern ‘::, 9, 15’ signifies lightning at place 9 and time 15. Here we have established a functional equivalence between the Robotese sign-design ‘::’ and the English sign design ‘lightning,’ as well as one between ‘::, 9, 15’ and ‘lightning at place 9 and time 15.’

But in the real order—i.e., the spatiotemporal order in which both the robot’s representings and the objects represented by it exist—it is possible to establish a systematic correlation between certain ‘matter-of-factual’ properties of its representational states and certain ‘matter-of-factual’ properties of the objects that it represents. The correlation has to be established as relations between matters of facts—which is to say, in terms of a set of cognitively discernible pattern-governed regularities—because it is not God-given: there are of course any number of more or less arbitrary ways in which one could establish such a correlation (which is why Rorty and other left Sellarsians reject Sellars’s picturing constraint on meaning altogether). But Sellars’s claim is that the correlation is constrained by the fact that representational systems are products of their environments—thus the ways in which they can represent their environments are delimited by certain fundamental features of those environments. For Sellars, the correlation is generated by the mapping function through which natural selection obliges representational systems to generate more or less adequate pictures of their environments. Of course, the crucial questions are whether we can identify one and only one relevant mapping function and what the proper criterion of pictorial adequacy might be.

If we grant its existence, the mapping function will account for the fact that there is a systematic correlation between tokenings of ‘::’, ‘éclair’, and ‘lightning’ in Robotese, French, and English, and instances of lightning in the world. There are matter of factual properties relating particular occurrences of these inscriptions and vocalizations to particular occurrences of lightning. This system of relations constitutes a pattern in the

causal order and it is this pattern which incarnates the rule. But crucially for Sellars, the regularities in the real order, which is to say, the regularities at the level of picturing, are the condition for the functional equivalences that obtain at the level of signification:

*Isomorphism in the real order between the robot's electronic system and its environment is a presupposition of isomorphism in the order of signification between robotese and the language we speak.*<sup>12</sup>

This is to say that while espousals of principle are *logically* irreducible to regularities of performance, such regularities provide the *causal* conditions for these espousals. Thus it is not linguistic competence that provides the criterion of pictorial adequacy, but rather pictorial adequacy that furnishes the criterion for linguistic competence. This is to say that the correctness of a picture provides the criterion for gauging the correctness of a linguistic performance:

*Linguistic picture-making is not the performance of asserting matter-of-factual propositions. The criterion of the correctness of the performance of asserting a basic matter-of-factual proposition is the correctness of the proposition qua picture, i.e., the fact that it coincides with the picture the world-cum-language would generate in accordance with the uniformities controlled by the semantical rules of the language. Thus the correctness of the picture is not defined in terms of the correctness of a performance but vice versa.*<sup>13</sup>

What does Sellars mean by “the world-cum-language”? If espousals of principle are reflected in uniformities of performance, then “the world-cum-language” is the set of uniformities or pattern-governed regularities generated within the natural order through the semantic rules espoused by language-using animals. But note that it is the espousals that generate the regularities, not the rules themselves: Sellars cannot grant causal efficacy to rules without hypostatizing norms as abstract entities and thereby violating his own naturalism, which forbids recourse to supernatural causation. If rules are constituted through the espousals of language-using animals, and espousals are the result of training, i.e., of animals learning to conform to the rules of criticism through which they are inducted into the normative order, then whatever causes the espousal can always be explained as the effect of a regularity rather than a rule. If so, Sellars’s fundamental distinction between rule-governed activity (i.e., reasoning) and pattern-governed behavior (i.e., conditioning) threatens to collapse. And without it, the attempt to ground the correctness of assertion in the correctness of picturing becomes otiose.

## Inferring

Sellars is well aware of this difficulty and provides some of the resources required to address it. The key to his response is the idea that rule-governed conceptual competence is itself a kind of practical know-how, but one generated through cultural rather than biological conditioning. The distinction between pattern-governed behavior and rule-governed activity is not a difference in kind; rather, rule-governed activity is a *species* of pattern-governed behavior: a recursive loop generated through the interaction between complex patterns. It is a patterning of patterns; but a patterning executed through the same kinds of causal mechanisms that generate patterns in general. Sellars illustrates this idea by modeling the distinction between pattern and rule in terms of the distinction between game and metagame:

*Pattern governed behavior of the kind we should call “linguistic” involves “positions” and “moves” of the sort that would be specified by “formation” and “transformation” rules in its meta-game if it were rule obeying behavior. Thus, learning to “infer,” where this is purely a pattern governed phenomenon, would be a matter of learning to respond to a pattern of one kind by forming another pattern related to it in one of the characteristic ways specified (at the level of the rule obeying use of language) by a “transformation rule”—that is, a formally stated rule of inference.<sup>14</sup>*

The metagame states the rules governing the game. The rules of a language consist of the formally stated rules of *material* inference specifying the proper function (i.e., the inferential role) of linguistic expressions. Such rules can only be stated at the metalinguistic level. The rules of an ordinary game specify the permissible ways pieces in the game can be moved. These rules are explicitly stated in the metagame; they are not part of the game itself (they are not pieces in the game). But competence in the game requires competence in the metagame.

The relationship between game and metagame can be illustrated through the following diagrams. In Sellarsian parlance they represent the language-entry transition from game to metagame (perception); the intra-language transition within the metagame (inference); and the language-exit transition from metagame to game (action):

## MOVING FROM GAME TO METAGAME

**‘My King is checked by his bishop’**

- Metagame

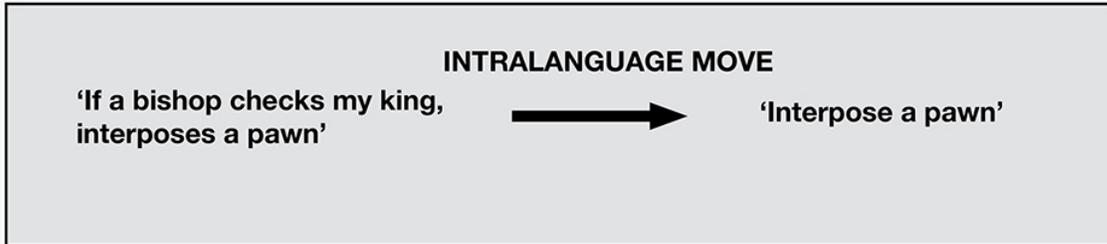


Language Entry Transition

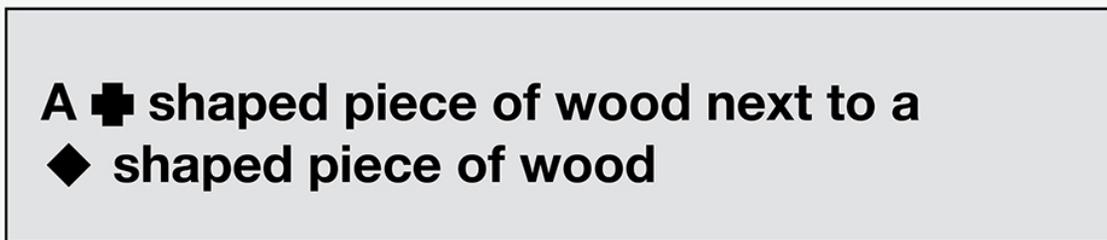
**A  shaped piece of wood next to a  shaped piece of wood**

- Game

## MOVING WITHIN THE METAGAME

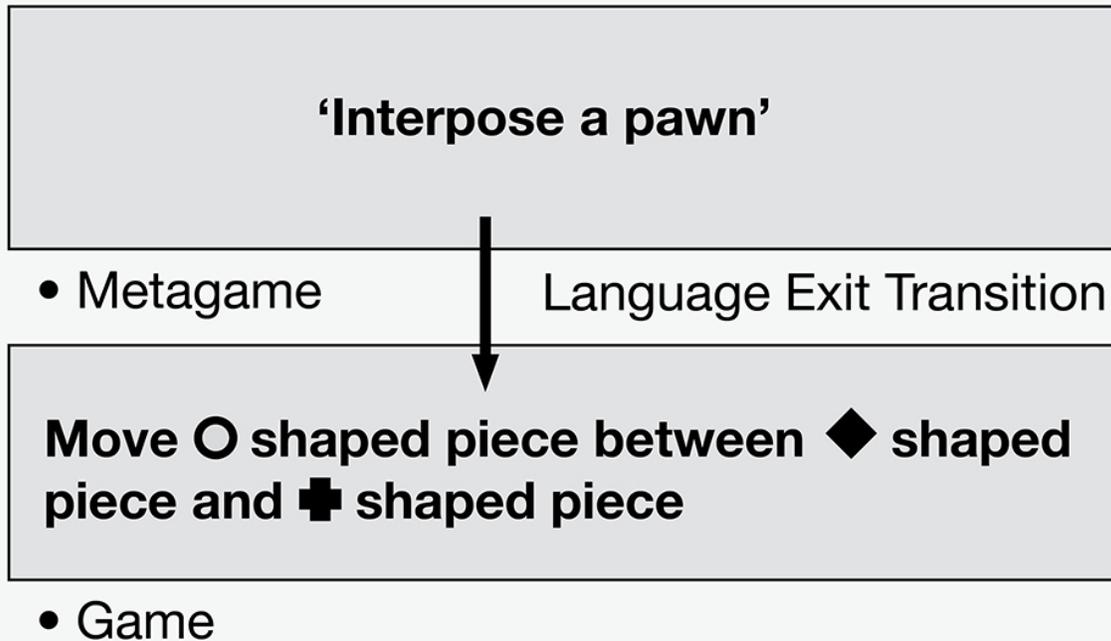


- Metagame



- Game

## MOVING FROM METAGAME TO GAME



Perceiving a specific configuration of ♖ et de ♗ shaped pieces of wood as a bishop checking a king; inferring “If one’s king is threatened by a bishop, interpose a pawn,” and interposing one’s pawn are all rule-governed practical competences akin to those involved in perception, reasoning, and action more generally. But perception, reasoning, and action must enable language users to find their way around in the world and satisfy their needs. If linguistic competence makes a difference in the world, language must be articulated with the world despite the fact that its conceptual structure does not directly reflect the structure of reality. Inferential competence is constrained by the need to map the world correctly.

### Mapping II

But what is the criterion of cartographic, which is to say pictorial, adequacy? It is formulated using our extant conceptual categories, and as such is internal to our signifying scheme and dependent upon our available predicative resources. Yet it can still be used to track the correlation between conceptual order and real patterns. Sellars’s

theory of picturing is an attempt to articulate the logical, i.e., normative-inferential, powers of concepts together with the empirical or ‘matter-of-factual’ characteristics of the linguistic items in which these powers are incarnated:

[...T]he ultimate point of all the logical powers pertaining to conceptual activity in its epistemic orientation is to generate conceptual structures which as objects in nature stand in certain matter-of-factual relations to other objects in nature.<sup>15</sup>

This is the point at which the Rortyan objection raises its head. How could the “world-cum-language” or the various matter-of-factual characteristics (shape, size, color, internal structure, etc.) in terms of which we correlate linguistic and nonlinguistic items provide a criterion of correctness for linguistic assertion? Since picking out these empirical facts will depend on our conceptual resources, which are norm-governed, all we are doing is comparing facts with other facts; specifically, facts about linguistic objects with facts about nonlinguistic objects. But the criterion of correctness will be internal to our system of linguistic conventions in both cases. Facts about pictorial adequacy are just that: facts. And like all facts, they will depend on historically circumscribed fact-stating resources, just as they will be intelligible only within the extant space of reasons in terms of which we justify all assertions concerning matters of fact. Thus picturing fails to provide a truly independent, which is to say, nonnormative criterion of adequacy for the alleged correspondence between the normative and real orders. Since any mapping function correlating the factual properties of linguistic items with those of nonlinguistic items will be more or less arbitrary, we cannot use it to establish a criterion determining the degree of pictorial adequacy between linguistic assertions and nonlinguistic reality. Given the arbitrariness involved, we could just as reasonably proclaim an ever-increasing divergence, rather than convergence, between our linguistic pictures and nonlinguistic reality.<sup>16</sup>

Such considerations doubtless underlie Rorty’s skepticism about Sellarsian picturing. But the objection misses something important. Sellars’s claims that logical powers have a “point” and that conceptual activity is endowed with an “epistemic orientation” need to be taken seriously. What we know about the world is always accompanied by what we know about our knowing about the world. Empirical science is not just the accumulation of facts about the world but also (and increasingly) the accumulation of facts about *how* we know the world. These facts help us orientate ourselves: they contribute to a narrative of our cognitive evolution that develops as part of our ongoing understanding of our biological and social history. Cognitive progress is not only charted in terms of

knowledge of facts, but also through facts about knowing. And knowledge does not only develop in the dimension of cumulating facts about the world but also in the dimension of integrating facts about knowing into our knowledge of the world. The veritable *telos* of cognitive enquiry is not exhaustive description but practical transformation: the integration of knowing and doing such that what we know about the world and our place in it allows us to transform both it and ourselves in order to realize our various purposes; purposes which are not fixed but perpetually redefined in light of what we come to know.

Thus knowledge of matters of fact is rooted in logical powers (powers of inference), but these logical powers must also be understood as rooted in objects in nature bearing certain factual relations—and hence natural capacities—vis-à-vis other objects in nature. The criterion of adequacy for picturing is internal to the signifying order because it is through reasons that we formulate our purposes. We do not measure this adequacy by stepping outside the conceptual order and comparing its degree of correspondence to the nonconceptual order. Rather, we use the conceptual resources of matter-of-fact discourse to try and make material mode statements about the second-order isomorphism between the properties connecting representations and the properties connecting the objects they represent. The mapping function does not preexist this discursive activity; it is constituted in and through the discourse that seeks to capture it. The attempt to uncover causal invariances between certain features of assertions and certain features of objects is part of the activity that contributes to the determination of the function. Thus the criterion of pictorial adequacy is also practical, not just theoretical: it is formulated in terms of the degree to which what we know about the correlation between representing and represented allows us to realize our purposes in the world. The adequacy at issue here is practical and transformative, not theoretical and contemplative. For Sellars, as for Hegel, the ideal is not an inert supernatural phantasm, but something that actualizes itself in and through the real. Because we are norm-governed creatures, our performances can be judged in terms of the principles they ought to embody. Even the claim that our performances *fail* to embody these principles presupposes the authority of the ideal on which we have defaulted. In this regard, empirical facts about the systematic uniformities between linguistic items and nonlinguistic objects are still facts about objects, not about concepts. That we need norms to state facts does not entail that all the facts we state are ultimately about norms. The Rortyan objection moves from the premise that all factual properties are norm-governed to the conclusion that all factual properties are normative properties.

The premise is true but the inference is invalid and the conclusion is false. Thus there is nothing intrinsically incoherent about Sellars's claim that we can use concepts to determine the degree of pictorial adequacy that concepts bear to nonconceptual reality.

### **The Immanence of Representation**

What can we conclude from this account? First, a lesson concerning immanence. What is transcendently immanent is the difference between representables and things-in-themselves, not the fusion of sensing and being proclaimed by philosophies of immanence (Bergson, Michel Henry). The transcendental difference between representables and things-in-themselves is not a two-world theory (sensible/supersensible), but a double-aspect theory about a single, immanent world. The distinction between the sensible and the supersensible is methodological, not ontological. The manifest world of intersubjective experience—encompassing both the public and private domains—is empirically real in the only acceptable sense of 'empirical.' What is immanent is our corrigible, justifiable, and shared knowledge of ourselves and our world. But this means that those philosophies of immanence which begin from an experience allegedly lying beneath or beyond judgment, categorization, and representation, begin from an abstraction. The way towards absolute knowing does not lie in plunging deeper into the alleged ineffability of subjective immediacy. It starts with the reflexive stratification of immanence into representing and represented, and the gradual recognition that what we know about the latter (the represented) is conditioned in ways we don't yet know by the former (our representings). Objective knowledge remains incomplete unless supplemented by knowledge of objectivating structure. This structure is spatiotemporal in a transcendental rather than empirical sense.

Thus there are two dimensions of spatiotemporal structure: the one which we represent, and the one in which our representing unfolds. The goal of cognitive enquiry consists in incorporating ever more facts about the structure of representing into every represented fact. This would be the naturalization of the involuted spiral of absolute knowing. In this sense, spatiotemporal location provides the transcendental coordinates for our species' collective *world story*.

*The “transcendental” or epistemic function of spatio-temporal concepts as forms of representing must be distinguished from their empirical function in matter-of-factual judgments about historical fact.*

In linguistic terms this means roughly that spatiotemporal predicates are essential not only to object-language statements, but to the metalinguistic statements that ascribe logical (epistemic) powers to linguistic forms.<sup>17</sup>

It is not only what is represented that is represented as existing at a particular location in space and a particular point in time; representing itself is located in space and is actual in time—but a noumenal space and time that, although conceived as partially analogous to the space and time proper to perceptual experience, possess their own distinctive structures to be uncovered through some future alliance of physics and neurobiology. What this amounts to is the claim that the logical powers of the concepts through which we apprise spatiotemporal reality are themselves spatiotemporally conditioned. As it progresses, the history of what we know incorporates within itself more and more facts about the empirical structure of knowing. The limit of this movement would be the point at which empirical (sigma-tau) facts about the structure of knowing are incarnated in the structure of empirical (spatiotemporal) facts.

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## Footnotes

1. Wilfrid Sellars. “Some Remarks on Kant’s Theory of Experience.” *Kant’s Transcendental Metaphysics*. Ed. J. F. Sicha. Atascadero, CA: Ridgeview Publishing, 2002. 271 para.13. Print.

2. *Ibid.* 269 par. 4.

3. Here I am indebted to Omar Talhouk’s MA dissertation “Natura Naturans: The Concept of a Nature for Representation,” American University of Beirut, 2014. Print.

4. *Ibid.*

5. Wilfrid Sellars. Op. cit. 2002. 428-429 par. 46-49.

6. This is not to say that conceptual intuitions deliver ultimate subjects of predication in the metaphysical sense. Sellars is careful to distinguish between complex particulars, exemplified by perceptual ‘this suches,’ and the simple or ultimate particulars sought for in metaphysical discourse. See Wilfrid Sellars. “On The Logic of Complex Particulars.” *Pure Pragmatics and Possible Worlds: the Early Essays of Wilfrid Sellars*. Ed. J. F. Sicha. Atascadero, CA: Ridgeview Publishing. 2005. 140-167. Print.

7. ‘Sigma’ and ‘tau’ are the names for the counterpart properties corresponding to space and time respectively.

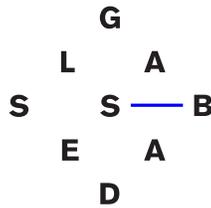
8. Wilfrid Sellars. *Naturalism and Ontology*. Reseda, CA: Ridgeview Publishing, 1980. 51. Print.

9. *Ibid.* 62.

10. Wilfrid Sellars. "Truth and 'Correspondence'". *Science, Perception, and Reality*. Atascadero, CA: Ridgeview Publishing, 1991. 216. Print. The expression "norm-nature meta-principle" is from James, R. O'Shea. *Wilfrid Sellars: Naturalism with a Normative Turn*. Cambridge: Polity, 2007. Print.
11. Wilfrid Sellars. Op. cit. 1991. 41-59.
12. Wilfrid Sellars. "Being and Being Known." *Science, Perception, and Reality*. Atascadero, CA: Ridgeview Publishing, 1991. 57 par. 53. Print.
13. Wilfrid Sellars. *Science and Metaphysics: Variations on Kantian Themes*. London and New York: Routledge & Kegan Paul, 1967. 136. Print. (My emphasis).
14. Wilfrid Sellars. "Some Reflections on Language Games." *Science, Perception, and Reality*. Atascadero, CA: Ridgeview Publishing, 1991. 209 par. 17. Print. (My emphasis).
15. Wilfrid Sellars. Op. cit. 2002, 275 par. 27.
16. Richard Rorty. *Philosophy and the Mirror of Nature*. Oxford: Basil Blackwell, 1980. 295-306. Print.
17. Wilfrid Sellars. Op. cit. 2002. 277 par 31-32. (My emphasis).

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## The Trans-Umweltic Express

Gabriel Catren

The reading of *The Glass Bead Game* by Herman Hesse in my late adolescence exposed me for the first time to the idea of a practice intended to *compose* the different modes of exploration of the experiential field in which we find ourselves (modes such as science, art, and politics). Hesse's program—conveniently enriched with other elements, coming notably from the transcendental and post-transcendental philosophical traditions—would ultimately lead me to the characterization of the philosophical activity that I currently endorse. By abducting the way Edmund Husserl named his philosophical project—*transcendental phenomenology*—we can characterize this conception of philosophy by means of the expression *immanent phenomenodelics*. On the one hand, the term *immanent* encodes the thesis according to which the subject of the *transcendental constitution* of subjective experience is itself a product of an *immanent institution* taking place within an impersonal experiential field. On the other hand, the term *phenomenodelics* results from the amalgamation of the term *phenomenon* (which is itself a hybridization of the Kantian notions of *phenomenon* and *noumenon* denoting the programmatic absolution of philosophy with respect to any form of transcendental limitation of experience) and the suffix *-delics* (which takes the place of the suffix in Husserl's *phenomenology* in order to stress that the *logos*-oriented *theoretical* mode of exploration should not have—I maintain—any privilege whatsoever in the philosophical activity).

In order to explain the relation between these ideas and Hesse's program, let me start with the most primordial *phenomenodelical* fact, namely that we are always already embedded in a *concrete* and *impersonal* field of experience. The term *concrete* is intended

here to stress that experience is always a fusion of percepts, affects, concepts, and intersubjective relations (in the most general—i.e., not necessarily human—scope of the term subject): to be there in the midst of the experiential field is to perceive, to feel, to understand, to be with, all at once, in an impure mixture. What I call an *abstract modality of experience* is a mode of experience resulting from a process of abstraction, i.e., from a process by means of which one abstracts certain dimensions of experience in order to focus attention on a single dimension. For instance, I can focus on the demonstration of a theorem by abstracting the perceptual field (e.g., the temperature of the room I am in, the visual field that surrounds me), the affective field (e.g., my current mood, the pulse of a symptomatic tic that affects me), and the social field (e.g., the actual human environment in the space where I am, the current political situation). I call the different dimensions of the experiential field that result from these abstractive procedures *plasma* (the affective field), *vision* (the perceptual field), *logos* (the rational field), and *socius* (the political field). But the experiential field *as such*—i.e., before subjecting it to the prismatic refraction that yields these various abstract modalities—is always a *concrete coalescence* of affects, percepts, concepts and intersubjective relations. Taking up Maurice Merleau-Ponty's (as well as Michel Henry's and David Cronenberg's) term anew, I call this concrescence *flesh*. The impersonal *flesh* is a solaristic *plasma* pulsed by drives and mesmerized by propagating *perceptual fields*, a deliquescent and iridescent element organized by the ingression of a *logos*, a phenomenodelical daydream inhabited by a *socius* of experience-able (receptive) and response-able (expressive) subjective fluctuations.



Mareaciones, Extract from video (Florencia Rodriguez Giles, 2015)

In this description, I presuppose the effectuation of what we could call—in the wake of Husserl—*phenomenodelical epokhé*. The *epokhé* denotes the *existential conversion* by means of which one suspends (or puts into brackets) any thesis regarding the ultimate nature, the supposed origin, and the hypothetical destination of the experiential field. By this conversion, every phenomenon is transmuted into a mere phenomenodelical *datum* drifting through the impersonal stream of experience. The term *flesh* denotes the phenomenodelical (im)materiality of this suspended field *in its multimodal concreteness*. The philosopher is floating within the ungrounded phenomenodelical flesh; traversed by percepts, concepts, affects, languages; inhabiting a *socius* of (inorganic, vegetable, animal, human, X) subjects. We could say that thanks to the *epokhé*, the subject—gaining access to this primordial scene of the philosophical mode of being—gets philosophically stoned.

In turn, the term *impersonal* (in the expression *concrete and impersonal field of experience*) is intended to stress that this field is always in excess with respect to the particular experience of any *actual* or *possible*, *individual* or *collective*, *empirical* or *transcendental* subject. This characterization of the experiential field implies that experience is always indexed by different forms of (what we could generally call) *locality*. Experience is always the experience of an empirical subject, which is always in a particular state (e.g., in a particular spatiotemporal position, in a particular state of motion, in a particular mood,

etc.). Moreover, such an empirical subject is always a token of a particular transcendental type of subjectivity, i.e., of a transcendental structure defining the *a priori* conditions of subjective experience in both its receptive (inhaling) and expressive (exhaling) flows. Therefore, experience is always indexed by both an *empirical* and a *transcendental perspectivism*. One particular existential possibility for a subject who finds itself locally embedded in this experiential field is to explore it, i.e., to try to mediate these different forms of locality. We can always (try to) take a walk. First, a subject can start exploring the field by forcing some changes of its empirical state (besides the changes existentially imposed on it by default, such as moving forward in time), thereby changing the content of its actual experience. By doing so, the subject affords a first form of exploration of the experiential field, what we could call an *empirical exploration*. Now, thanks to Immanuel Kant we know that the empirical degrees of freedom of a subject are dependent upon its transcendental type. Borrowing Jakob von Uexküll's terminology, we could say that its possible empirical movements unfold in a certain *Umwelt* (enviroming world), which depends on its transcendental structure. For instance, the empirical degrees of freedom of a tick and a human being—and thereby the *Umwelten* in which they can move—are not the same. If the subject wants to radicalize the scope of its exploration beyond its transcendental-dependent *Umwelt*, it must address the task of performing transcendental variations (*trans-variations*) of the very transcendental structure that makes its experience possible. To effectuate such trans-variations means to perturb, to deform or to induce mutations of the very transcendental frame that makes its experience possible (in its conceptual, perceptual, affective, social, linguistic, sexual, historical, and cultural dimensions). So finally, what I call a *speculative subject* is a subject that, besides being able to modify its *actual* experience by changing its state in its *Umwelt*, also affords mutations of the very transcendental frame that defines the “umweltic” horizon of its *possible* experiences.

To mediate the limits of experience does not only mean actualizing new possible experiences, but also modifying the transcendental frame that demarcates the possible experiences from the “impossible” ones. To do so, mankind has constructed specialized *organons* of mediation—such as art, science, and politics for instance—as well as different forms of existential practices (like for instance gymnastical, erotical, dietetical, and liturgical practices). These *organons* generally proceed by focusing on a particular modality of experience by abstracting the others. We can mediate the limits of experience by selectively plugging into the experiential field *affectively* (by tuning with the *plasma*), *perceptively* (by tuning with the *vision*), *conceptually* (by tuning with the

*logos*), or *politically* (by tuning with the *socius*). The thesis according to which the different abstract modes of exploration of the field (art, science, politics, etc.) do construct vectors of *speculative* transcendence means that they do not only allow us to perceive, to feel, to understand, and to produce new phenomena, but can also force transcendental variations of the *a priori* conditions of perceptibility, affectability, conceptuality, sociability, and production. The hybrid neologism *phenoumenon* (which traverses the Kantian distinction between phenomenon and noumenon) is intended to stress that the “intentional” pole of a “speculative” experience—i.e., of an experience enveloping a shift of the subject’s transcendental structure—is not an objective phenomenon constituted by the subject, and thus placed in a transcendental-dependent *Umwelt*. Rather, the pole of a “speculative” experience is a trans-umweltic configuration of the experiential field—i.e. a *phenoumenon*—that appears in each *Umwelt* under the form of a particular objective phenomenon.

For instance, theoretical reason (of which science, in the restricted sense of the term, is a particularly sophisticated form) is a particular mode of exploration that tries to expand our *rational* understanding of the different kinds of *phenoumena* that inhabit the experiential field (e.g., formal, physical, biological, and sociological *phenoumena*). Theoretical reason explores the experiential field by means of an experimental and theoretical *organon* that *selectively* focuses on the *perceptual* (in the experimental-technological sense of the term) and *conceptual* modes of the field to the detriment of the other dimensions (such as for instance the affective or the political dimensions). We could say that science has expanded the doors of (technologically mediated) perception and (formalized) conceptualization through the abstraction of other possible modalities of exploration. In order to mediate the limits of our understanding, theoretical reason cannot proceed by just applying the same toolbox of conceptual categories, linguistic structures, and techno-perceptual resources to new experimental data, but it also has to modify—when necessary—the very transcendental framework of linguistic expression, formalization, schematization, conceptualization, and technological perception.

According to what we have said, art, science, and politics (among other possible practices for the expansion of experience) operate differential transgressions of the (empirical and transcendental) limits of human experience by stalking the trans-umweltic interzones of the impersonal experiential field. Now, by following Hesse’s main intuition, we could try to carefully define, construct, and activate a single concrete *organon* of exploration of the experiential field capable of *composing* these different abstract sounding lines of

mediation. The program of constructing this trans-modal *organon* is (according to its definition) much more radical than the program of performing transversal compositions that are *internal* to each abstract modality, such as for instance the interdisciplinary collaborations between different *scientific* disciplines or multimedia integrations of different *artistic* practices. Since philosophy has historically provided the most radical attempts to put science, art and politics on a single plane of compossibility (such as for instance in the works of Plato, Aristotle, Kant and Hegel), I took the decision—in the wake of Badiou—to keep the term *philosophy*—or more accurately, in the terms of the Jena Romantics, *symphilosophy*—to designate this concrete *organon* of mediation. However, this terminological decision is not blind to the fact that the current practices of philosophy do not faithfully enact this trans-modal composition, notably because of the fact that philosophy has never (or very rarely) put into question the canonical form of philosophical expression and production: philosophers have always written books in which they speak *about* science, art and politics, rather than creating *organons* of exploration *effectively* entangling scientific, artistic and political procedures. We could say (by adopting a Marxist phrasing) that philosophers have hitherto only thought about the compossibility between science, art and politics; the point, however, is to concretely effectuate this composition.



Mareaciones, Extract from Video (Florencia Rodriguez Giles, 2015)

Certain extended forms of art have provided examples of trans-modal programs and strategies for inducing *concrete* modes of exploration of the experiential field, notably by producing—in the wake of the speculative romanticism (see for instance *The Oldest Systematic Program of German Idealism* of the classmates Hölderlin, Hegel, and Schelling)—aesthetico-theologico-political knots. We can think for instance of Stéphane Mallarmé’s attempt to put poetry at the service of a forthcoming secular ceremony (modelled on the Catholic Mass) in which the “crowd” will recognize itself; of the project of a *gesamtkunstwerkian* piece capable of enveloping existing artistic disciplines into a single “total(itarian?)” (political-)artwork trans-modally connected (at least programmatically) to the utopian project of staging a mythic scene for the institution of a new political subject; or—in another zone of the political spectrum—of Walter Benjamin’s and Bertolt Brecht’s attempt to counteract the fascist “aestheticization of politics” by means of a “politicization of arts”. More recently—like for instance in Joseph Beuys’ *social sculpture* or in the framework of the so-called *curatorial turn* (notably launched by Harald Szeemann, the curator of the exhibition *Der Hang zum Gesamtkunstwerk*)—artistic practices have concretely addressed the problem of blurring certain boundaries (such as for instance the boundaries between art and daily existence; between stage and audience; between presentation and representation; between original and copy; between artist and curator; between container, context, and content; between production process, product, display, and theoretical reflexion) in order to induce trans-modal connectors between artistic, social, existential and theoretical practices. Philosophy, as I understand it, has to carefully evaluate these trans-modal projects as well as their possible impasses and dangers (we can think for instance in Philippe Lacoue-Labarthe’s critical assessment of the onto-typological conception of politics in terms of a fictional myth, or in Hans-Jürgen Syberberg’s controversial thesis according to which it is necessary to “redeem” the Wagnerian project of a *Gesamtkunstwerk* from the instrumentalization implemented by the Third Reich) in order to adapt and adopt—when considered convenient—some of their strategies.

In any case, the philosophical *Glasperlenspiel* cannot be understood as a *Gesamtkunstwerk* for the following reasons. First, it is not the task of the philosophical composition to produce a total work *of art*, i.e. to produce mediators of the limits of experience under the aegis of the aesthetical interest of reason. In order to attain a full-fledged philosophical transversality and span a truly trans-modal space of compossibility, artistic practices in the restricted sense of the term should play no privileged role, and no mode of exploration—such as theoretical reason in its most sophisticated forms—should be

excluded. Second, it is not the task of the philosophical composition to produce a *total* work of art: the trans-modal philosophical organon—far from providing an overarching position capable of totalizing the abstract modes of thought —acts horizontally, within the “plane” occupied by these modes, by trying to *locally* synthesize abstracts procedures of exploration into concrete mediators. Far from occupying a position of domination—and far from believing that the multiplicity of abstract modes of thought could be the object of any totalization whatsoever— philosophy has to defect its supposed self-sufficiency and humbly submit itself to the irreducible sovereignty and multiplicity of these modes. Last but not least, the speculative subject that operates the philosophical probes aims to be an *untyped* subject, i.e. a subject absolved from the transcendental onto-typologie that pretends to condemn the subjects of experience to be tokens of a unique transcendental type.

Now, this leads me to another important obstruction to the activation of a truly philosophical *organon* of mediation, namely the “sutures” (to use Badiou’s terms) between philosophy and these abstract modes of exploration, such as for instance the suture between philosophy and science (e.g., Husserl), the suture between philosophy and art (e.g., Heidegger), or the suture between philosophy and ethics (e.g., Levinas). The definition of philosophy as an *organon* of concrete composition requires absolving philosophy from these “sutures”. Philosophy shares with the abstract modes of exploration their vocation to transgress the (empirical and transcendental) limits of human experience, but it must counterbalance their inherent tendency to abstraction, to depart from the multi-modal concreteness of the experiential field in order to focus on a single abstract modality. Philosophy—in this forthcoming enhanced form—can be understood as a higher form of synesthetic exploration directly plugged into to the flesh as such: philosophy does not only compose different *sensory* vectors of mediation (visual, acoustic, etc.) into synaesthetic sensoria, but also affective, conceptual, existential, and political ones. We could say that philosophy enriches the trans-umweltic directionality of the different abstract vectors of exploration with an inter-modal degree of freedom. The trans-modal vocation of such a philosophical *organon* implies that it should not establish any privileged identification to any abstract mode of experience, be it art, science or politics. In other words, no abstract mode of exploration can pretend to occupy a privileged position in the philosophical space of compossibility, that is to say an overarching position from which it could subordinate or dominate the other modes. In particular, science (or, more generally, theoretical reason) is nothing but one particular modality of experience, a mode of experience that focuses on the expansion of

conceptual and techno-perceptual experience. As such, science is an important ingredient in philosophical composition. However, any form of identification between science and philosophy, any attempt to understand philosophy as a science of sciences (Fichte), as a first or “rigorous” science (Husserl), or any definition of philosophy as a *theoretical* mode of thought defined with respects to the supposed (transcendental, etc.) limits of science betray the trans-modal nature of the philosophical exploration. It is not the task of philosophy to conceptually understand the *logos* that inheres the experiential field: the task of not giving up on the desire to understand the rational structure of the experiential field—be it at the ontological, transcendental, or ontic levels—is the defining prerogative of science (in an extended sense of the term).

In particular, we can provide a new meaning to the expression *philosophy of X* (as in philosophy of art, philosophy of science, etc.): the application of the philosophical *organon* to any abstract mode of exploration requires addressing the latter in its full concreteness. Even if a mode of exploration is oriented by a particular interest of reason (theoretical, aesthetical, political), this does not eliminate the fact that it is a concrete human activity endowed with a multi-modal richness. For instance, mathematics is oriented by a theoretical goal (to expand our rational comprehension of formal—geometrical, algebraic, numerical, etc.—structures); but it is also a concrete human activity undertaken by concrete human beings embedded in a concrete experiential field, and therefore an activity endowed with aesthetical, political, and affective dimensions. And these dimensions open communicating vessels that discretely connect mathematics to the other abstract modalities of exploration. Hence the expression *philosophy of X* does not mean that X is itself considered an object of a *theoretical* meta-discipline—e.g., epistemology, aesthetics, etc.—(in this sense, as Louis Althusser claimed, philosophy has no object), but rather an activity intended to reinsert an abstract mode of exploration in the concreteness of its effective practice, thereby opening it to possible alliances with other modes of exploration, alliances that might finally compose concrete mediators of the limits of experience. This reinsertion of an abstract sounding line of exploration within the concrete experiential field should counteract what we could call the *pathologies of abstraction*—that is, the tendency to hypostasize or isolate a mode of exploration by forgetting its intertwining and its dependency with respect to the other modalities (e.g., the dependency of—even the purest form of—scientific inquiry upon politics).

In Hesse's novel, this risk is explicitly addressed under the form of Father Jacobus's criticism regarding the isolation of Castalia with respect to the rest of the world, its ludic aestheticism, its high-culture elitism and its historical detachment. Strictly speaking, the Glass Bead Game—in its ludic, elitist, and isolated existence—still misses the philosophical project of activating an *organon* of trans-modal composition. In this novel, Hesse accomplishes the transition from the description of a single individual's formation and maturation explored in his previous works—fully inscribed in the tradition of the *Bildungsroman*—to the description of the development of an institutional collective subject, more in the wake of Oswald Spengler's *Decline of the West*. This transition is required by the very ambition of the project: the construction of an *organon* of composition capable of entangling the different abstract modes of mediation produced by mankind cannot be carried out by a single individual. However, the resulting collective subject still finds itself in a state of relative isolation, in the sense that it has uprooted itself from the human community at large and more generally—we could add—from the phenomenological field of life, from the *socius* in all its human and non-human forms. In this way, Hesse explicitly (and maybe self-critically) acknowledges the impasses of the Glass Bead Game project, impasses that ultimately lead to Knecht's decision to defect from Castalia, to counteract its purist and academicist transcendence, its ascetical retreat, its egotistic ludic monadology, its lack of historical and political engagement.



Mareaciones, Extract from Video (Florencia Rodriguez Giles, 2015)

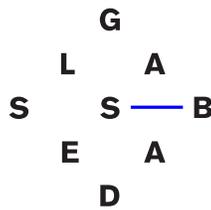
In order to conclude, I would like to stress the importance of a comparison that subtends Hesse's novel, the comparison with music. By paraphrasing Mallarmé, we could say that *we find in Music several techniques that seem to us to belong to Philosophy; we reclaim them.* Music operates a synthesis of (what I consider to be) two essential registers of philosophical labor: *multi-modal composition* and *trans-individual concertation*. Music has the capacity to construct cross-modal vectors of exploration of the phenomenological flesh by composing *formal structures*, *perceptual qualities*, and *affective resonances* on the one hand with the capacity to induce a *collective* (and thereby political) *attunement* on the other. Regarding this last dimension of music, I think that philosophy can also be understood as an operator of trans-individual concertation in the following sense. A philosophical composition—far from being an end in itself—is an operator intended to force a differential concrete mediation of the *transcendental* limits of experience. A speculative subject is a plastic subject that can explore the experiential field by successively embodying different transcendental viewpoints, a subject that can afford (at least in principle) inter-kingdom, inter-natural, inter-cultural, inter-species, inter-nebular becomings. Now— as Husserl taught us—the fact that we can turn around a cube implies that the subjective experience of the cube is always more than the perspectival experience of one of its profiles. Since the degrees of freedom of an empirical subject allows it to take a walk in the corresponding *Umwelt*, the intentional pole of its experience is the *objective* cube as such, in the projective synthesis of its multiple profiles. We sublimate the visual perspectivism of experience by the simple fact that we can take the position of any other subject in the corresponding umweltic space. If one now extends the subject's degrees of freedom by including variations of its transcendental structure, the subject acquires the possibility—at least in principle—of having an experience of the *phenomenal* cube as such, in the projective synthesis of (at least some of) its multiple phenomenal objectifications.

We could say that the speculative subject that pilots such a Trans-Umweltic Express can actualize *multiscopic* modes of experience in the sense that it can synthesize multiple transcendental standpoints. This speculative multiscopicity goes hand in hand with a diffusion of the subject's localization: a speculative subject is a smeared form of subjectivity that, far from being sharply localized, is distributed through a certain region of the space of possible transcendental structures. At a purely physiological level, the brain is capable of *synthesizing* the visual information separately provided by each eye in order to produce a *single* visual experience. Now, since the eyes occupy different spatial

positions the resulting binocular vision does not have, strictly speaking, a well-defined focal vantage point. And this lack of a sharp localization induces the three-dimensional depth characteristic of human optic experience. We could even conceive a multiscopic generalization of binocular vision given by a spatial distribution of multiple eyes and a brain-like *organon* of synthesis capable of producing a single visual experience endowed with higher forms of depth perception. In the same way, a speculative experience cannot by definition be carried out by a token of a unique transcendental type, i.e. by a subject sharply localized in the space of possible transcendental structures. Now, the resulting *untyped* modes of subjectivation, by affording the task of sublating the transcendental perspectivism, are more prone to inhabit the immanence, to activate new speculative forms of depth perception, affection and conceptualization. The higher the degree of trans-umweltization of a speculative subject the lower the extent to which its experience is subjectively lived as a form of intentional *transcendence* unfolding from a sharply localized subjective vantage point to a constituted object. In short, the *trans-umweltization* of a subject's experience goes hand in hand with its *immanentization*. The process by means of which a speculative subject groks the experiential field points towards its impersonal and a-perspectival limit: a completely trans-umweltized experience is a self-experience of the phenomenological flesh itself, an immanent self-experience deprived of any form of transcendence, a collective no-body's experience of no-thing. By paraphrasing Hesse, we could say that *the esoterics of the glass-beadical organon points down into those depths where the phenomenological flesh eternally breathes in and out, sufficient unto itself*, in the ebb and flow of its immanent self-experience. In this way, the philosophical labour enhances the mutual attunement of a multiplicity of consonating subjects that imbricate their experiences in a collective immanent self-experience. We could say that the "musaical" scope of symphilosophy is given by the fact that it puts the inter-modal *composition* at the service of an immanence-oriented *concertation*. This collectivisation of experience, this weaving of a phenomenological community—far from depending on an identification with respect to a mythical (transcendental) type—stems from the speculative trans-typification of subjectivity.

This text is based on a conversation conducted by Jeremy Lecomte for Glass Bead. Some of the topics addressed in this interview were developed in Gabriel Catren. "Pleromatica o las Mareaciones de Elsinor." *Nombres. Revista de Filosofía* (29) 2015. Web. (<http://revistas.unc.edu.ar/index.php/NOMBRES/issue/archive>) A shorter version of this text was published in Sonia de Sanctis and Anna Longo, eds. *Breaking the Spell. Contemporary Realism under Discussion*. Mimesis International, 2015. Print.

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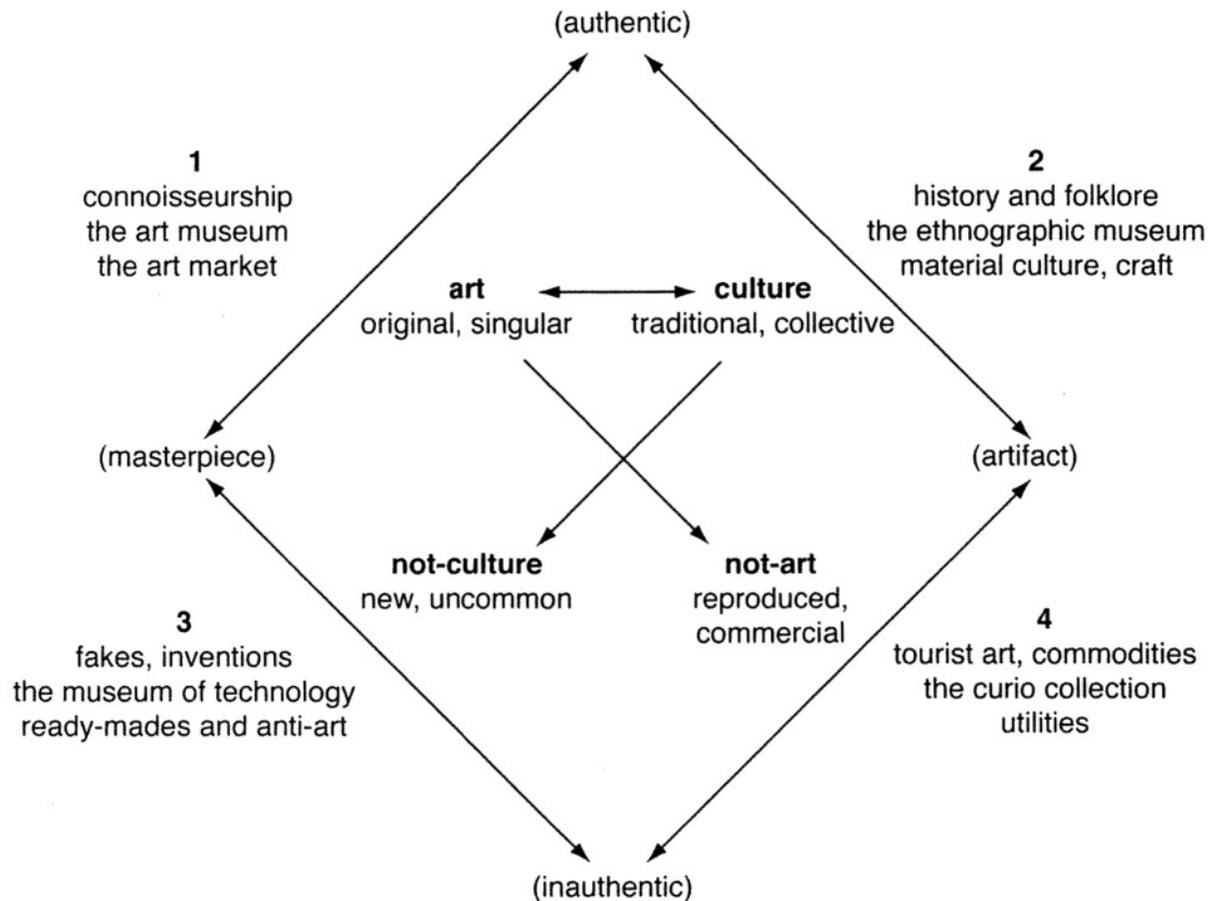
## The Third House

Anselm Franke

How does the exhibition as a medium partake in the ontological partitions of modernity? This question seems particularly relevant in a time when it has become urgent to put curatorial practice on new conceptual ground—a fundament that is not limited to art history, but instead is capable of re-contextualizing art history itself against materialist social histories and a multiplicity of modern media-technologies and boundary-making practices. It is a question that is also important in a moment where thingness and object-oriented ontologies have considerable influence on artistic and exhibition practice. For my part, I consider the medium of the exhibition a possible *ontographic* device—a medium that is particularly well-equipped to deal with the ontological separations of the modern age (and perhaps only the modern age); the production of both subjects and objects, without ever taking their existence for granted, but engaging with their emergence from a “middle ground” where we find media and images situated at a tilting point, where object and subject become *Kippfiguren* (multistable images), and the forces of poesis and pathos enter into relations of reciprocity and create a meridian of mediality, giving access to a possible vertical history. To disappoint the speculative realists of the first hour, the exhibition, I think, is not a place where one could ever hope to leave the correlational circle, the reciprocal conditioning of consciousness and world, subject and object. Instead, it allows us to interrogate the conditions of mediation and separation within correlational circles: an exhibition can take us to the foundations and the limits of those circle(s) because it can explore the thresholds of the correlation between consciousness and form.

My argument for the medium of the exhibition as a place that is particularly suited to a complex analysis of borders and frontiers across different epistemological registers, and as a place where both cognition and aesthetics partake and enact frontiers, is perhaps substantiated by the following effort, in which I test whether and how the exhibition can positively figure in the “Constitution” of modernity as proposed in an influential model by Bruno Latour in 1993.<sup>1</sup> This model tries nothing less than to sketch up the ontological partitions of modernity—providing a diagram of the constitutional separations that made modernity modern, both within (modern institutions) and without (the difference that would become now inevitably “pre-modern”).

In Latour’s graph, there is no place for the institution of “art.” I therefore begin by looking at a related diagram: in 1988, James Clifford sketched what he called the Western “Art-Culture System” as that which has been operative in Western institutions, within a fourfold semiotic graph unfolding between “art” and “culture” at the top, and “not-culture” and “not-art” at the bottom. “Art” is qualified as original and singular, the product of an identifiable author, validated by connoisseurship, museums and the market; whereas “culture” is collective, traditional, and validated by history, ethnography, material culture and crafts. The two poles share a common value-orientation towards the “authentic,” while they are separated by the “masterpiece” on the side of “art,” and the “artifact” in the case of “culture.” On the lower part of the graph reads “not-art” and “not-culture”; not-art being the commercial, the reproduced, tourist art, or commodities, and not-culture being the “new and uncommon,” which includes radical artistic gestures in the moment when they are not yet accepted as “art,” but above all, includes the entire realm of technological invention, insofar as it somehow constitutes a surplus with regards to the mere “commercial”—and, we might add, functional—sphere.<sup>2</sup> Between the poles in the graph there is of course movement, as when things of cultural value such as so-called “tribal objects” are suddenly granted the status of art, or when previously “low,” inauthentic art is uplifted in a similar fashion. Movement in the inverse direction occurs whenever works of art are culturally and historically contextualized. Indeed, movement in the graph constitutes a great deal of canonical history in the field. It is as if “history” itself consists of exploring the possibilities of movement and transformation within the matrix.



“Art-Culture System: a Machine for Making Authenticity”, diagram by James Clifford (From *The Predicament of Culture: Twentieth Century Ethnography Literature and Art* Harvard University Press, 1988).

But such a description of the “economy” of internal divisions and hierarchies in art can gain further contours by being placed and described within the schematic systems of knowledge disciplines and the division of labor of modernity itself. It then becomes possible to define more specifically the boundary-making practices in which art is immersed. What Clifford attempted for the “Art-Culture System,” Bruno Latour attempted to do for modernity, particularly with respect to the pertinent division between the natural and the social sciences. In his book *We Have Never Been Modern*, Latour does not simply expound another Greimasian semiotic square from a structuralist bird’s-eye view. We may suggest that he aspires to account for the onto-genesis of the modern categories from a point of view of an anti-reductionism—a terrain where received categories are already undermined. And, indeed he does not have to look for a subterranean realm where these categorical crossings and transgressions happen, as it were, by night; he looks instead at the newspapers, and turns to the sky, using the ozone hole as an example of an “object” that cannot be defined as being either purely social,

natural or discursive but instead constitutes a paradigmatic “hybrid” made of politics, nature and society alike. And what a hybrid that is and has since become, if we only think of the way “nature” has entered into “human” history once again through climate change. Latour searches for the zero-point of the division that has held modern thought in an iron-grip: the division between the natural world and society; which translates, by extension, into the division between primary and secondary qualities, *res extensa* and *res cogitans*, and the standard dualist metaphysics of everyday instrumentality based on the mind/body split. He distances himself from the narrative of the division of labor and the differentiation of functions in modern society, into the separate realms of politics, economy, the law, science, art, and mass media, and above all, from the assumption of a fundamental division between nature and culture, of a separate physical environment and society. He instead describes the coming-into-being of the relative categories nature and culture, or subject and object as poles, as if from the middle, along a continuum from relative stability to mobility and a horizon of “the event”—a primordial event (or never-ending series of events) where, with Michel Serres, “the object as such constituted the human subject.”<sup>3</sup> In the role of the anthropologist who brings anthropology “home from the tropics,” he focused on networks in which agencies are entangled and distributed among human and nonhuman actors and organized by narrative structures. Its self-description in terms of a gradual disentanglement of the natural and the social, the subjective and the objective, by means of which humankind breaks free from the chains of nature to the degree that it produces objective knowledge of nature’s (fundamentally indifferent) laws, Latour claims, has been taken in by self-deception. This momentous self-deception has been the result of a gigantic effort of “purification” of the social and the natural into increasingly separate domains—an effort whose official languages have systematically obscured the “work of translation,” that is, the terrain of mediation, which Latour calls a “middle kingdom,” “as vast as China and as little known.”<sup>4</sup> What differentiates modernity from the non-modern is thus neither the work of translation nor its scientific-technological configuration, but a strange renouncement of the “collectives” that are formed from material, social and discursive entities. This *renouncement* is the price that is being paid for the “purification” of nature and culture into the separate categories of the human and the nonhuman, scientific objects, and political subjects.

Latour describes the “modern constitution” as being based on two interrelated “great divides”: the first between subject and object, or social and natural, which are each to be purified in their respective domains; and the second divide that separates this realm of

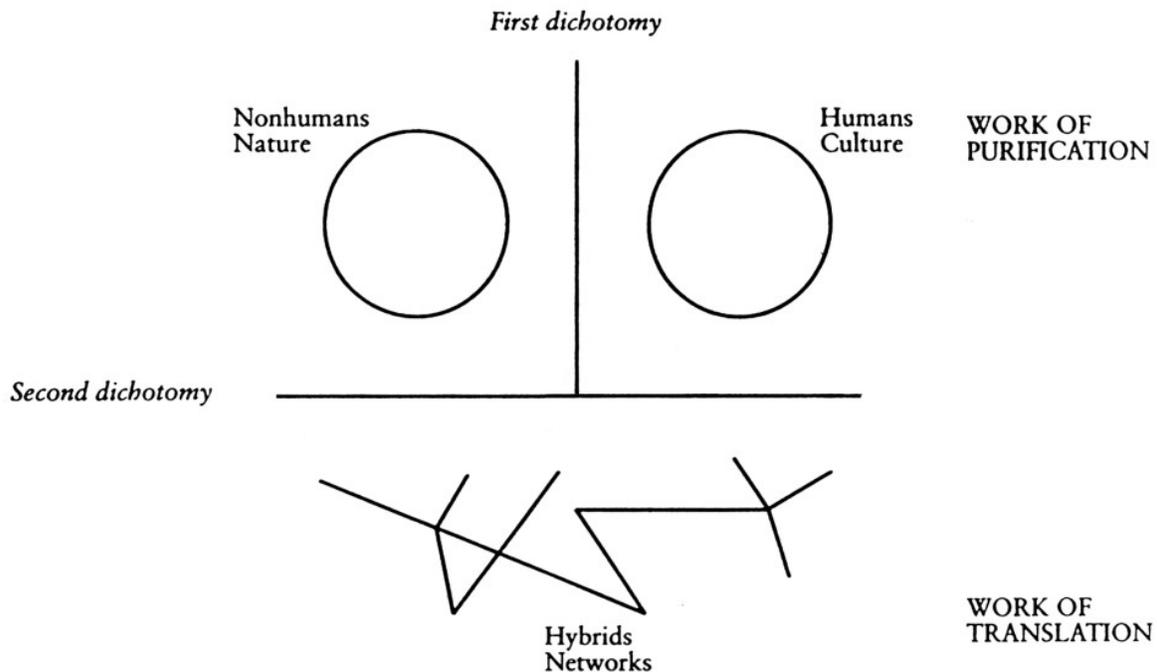
“official representation” from the work of mediation and translation in which “hybrids” are produced (these encompass the religious just as the technological, and their corresponding forms of subjectivity). But this realm, this so-called “middle kingdom,” is foreclosed from “official” representation. “Everything happens in the middle, everything passes between the two, everything happens by way of mediation, translation and networks, but this space does not exist, it has no place. It is the unthinkable, the unconscious of the moderns.”<sup>5</sup>

Latour may be at his most controversial, contradictory and amusing where his heuristics of networks turns into a psychogram of “the moderns,” where he seeks to describe the leap, the sleight of hand, the propaganda through which this disavowal of “hybrids” occurs. For that seems to require that “the moderns” not only “see double” and talk in “forked tongues”; it evolves in a matrix of mutually exclusive and internally contradictory “options” provided by the “constitution” as if on a playing field:

*A threefold transcendence and a threefold immanence in a crisscrossed schema that locks in all the possibilities: this is where I locate the power of the moderns. They have not made Nature; they make Society; they make Nature; they have not made Society; they have not made either; God has made everything; God has made nothing, they have made everything.*<sup>6</sup>

The result is that mediality and the social nature of relations between people and their environments is permanently being eclipsed, made to disappear as if by a sleight of hand, “and they can never be caught red-handed.”

Latour speaks of two official systems of representation that are erected on the grounds of the unrepresented and disavowed hybrids: political representation for subjects and society, and representation “in the laboratory” by science alone for the true, purified “speech” of objects and nature, now speaking the language of facts.



“The Modern Constitution”, diagram by Bruno Latour (From *We Have Never Been Modern*, Harvard University Press, 1993).

Are not the two lines of division in this diagram, one horizontal and one vertical, corresponding to different kind of imagery, as if they could also be conceptualized as screens? Are images not what emerges exactly at the sites of these divides, crossing and organizing them at the same time like mediating boundaries?

What kind of image then corresponds to the “first divide”? It is an image, or better: a condition of the image as eternally torn between the subjective and the objective, either conceived as illusionary-projection or as documentary, truthful representation. Latour’s crisscrossed scheme indeed also manifests itself on the level of the image: the image as a middle ground that is disavowed, for we can only ever think of the image as either entirely subjective or objective.

It is important to recall the core of Latour’s thesis, namely that the two “upper” halves of the divide are the product of one and the same division, and that it is indeed the division that produces both poles as an effect. They are the mutually exclusive and recursive production of a border-making practice, whose product is paradoxical, an internally divided and contradictory matrix “that locks in all possibilities.” Taking Latour’s model to its conclusion, we can say that they posit subject and object as *Kippfigur*. It is precisely a recursive production of a reversible figure and ground, where we can exchange between

two perspectives, but can only ever see one as figure at any given time, while the other must recede into the supporting back-ground, the “milieu”, that makes its interpretation in the terms of a “seeing as” plausible. It is perfectly possible to trace this character of the *Kippfigur* with regards to the ascription of the image either to the realm of the objective or subjective in debates on iconoclasm, as Latour has done,<sup>7</sup> or in debates around the status of photography and its role in legal forums.<sup>8</sup> Images, too, must take sides: as neutral windows adequately representing the objective world (by way of divine or machinic inscription producing an uncontaminated mimetic accuracy that reduces the deceptive to a minimum), or as mere subjective representations, with no claim to an objective world; that is, in the last instance, as an “animated mirror” of sorts.<sup>9</sup>

And what about the second divide—the one that divides the realm of purification from the “unconscious” realm of mediation and hybrids? This second divide appears as a screen of forever murky imagery, a theatre of defense and appropriation, the imaginary figuration of the constitutional outside: the barbarian, the animal, the man-machine, Donna Haraway’s “monsters.” Here, the advancing frontier of modernity produces the spectacle of its negatives and its “exports” into the outside: of the primordial and archaic past, the “irrational” colonial outside, and of a techno-utopian or dystopian future. It is a screen which acts both as a mirror and a window, operating the limits of “symbolic order,” whose “outside” appears as a variously metamorphic, projected ontological anarchy, or as a diabolic realm of partial objects, spectrality and monstrosity. It is at this divide that the small and grand border-dramas of modernity are formed. In fact, all the aesthetic genres known to us partake in its logic of liminality, and it is the basis on which they turn into the formative scripts of its frontier-mythologies. All human societies, it appears, are formed by such a limit, drafted as a circle drawn by the social contract into the not-yet divided terrain of sociability, instituted as a negative that is folded up within, creating in turn a highly organized and yet anarchic realm that acts as the imaginary outside which the very distinctions that organize this society within break down.

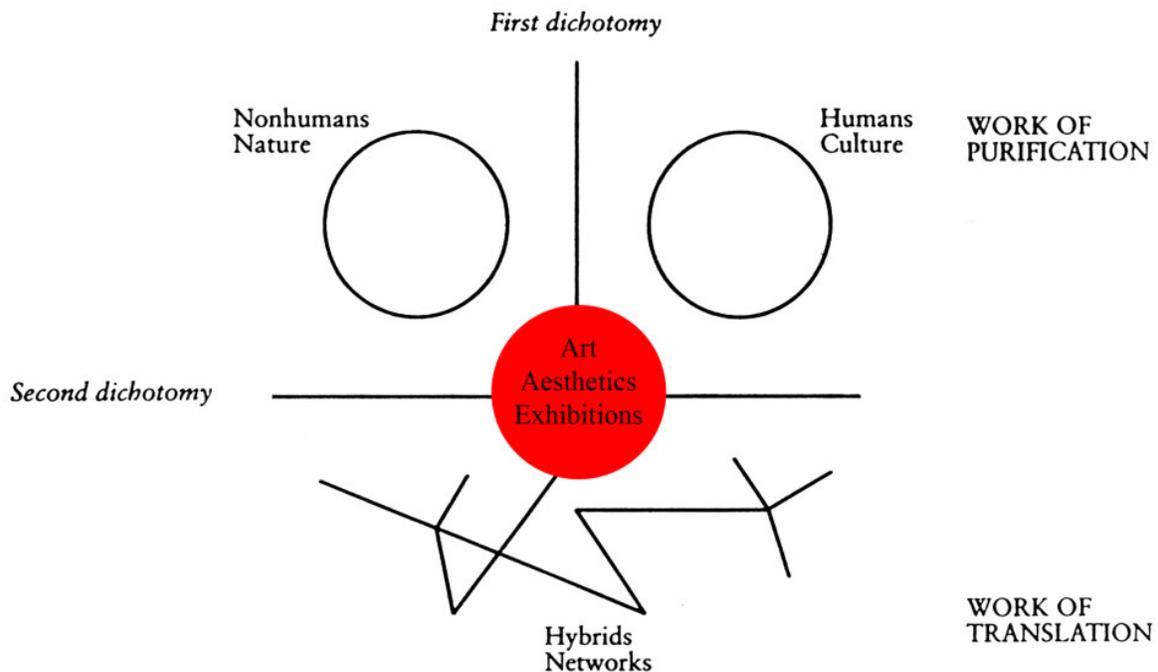
In 1993, Latour declared the crisscrossed schema of the constitution and the system of divisions of modernity as ultimately bankrupt. The hybrids that this system allowed to proliferate, he says, have overwhelmed the realm of purification – one symptom of which is the ecological crisis, where society, nature and technology are all hopelessly interlaced. The very fact that he could delineate, in 1993, the entire constitution including its (excluded yet proliferating) “unconscious,” finally, is proof of its collapse: for within the registers of the constitution, delineating the very relation between purification and hybridization/mediation was allegedly anathema and could hence not come into view.

The constitution, according to Latour, forbade the “official” representations of hybrids, in order to destroy and develop them. It could only represent them as objects yet-to-be-purified.

But at the very site where these two divides meet, has there not been this most marvelous stage, where all the contradictions of the scheme came to be “officially” dramatized? An institution which appropriates, hosts, and articulates the different kinds of hybrids and images I have outlined above? Is this not a space of “official mediation,” of “represented hybrids”—the space of the museum? A peculiar space that had been granted the rights and the power to represent “hybrids” officially, assigned to act as what I might refer to as an *ontological quarantine*. At middle of the diagram there ought to be *the medium of the exhibition*. It is the always-contested “space of the arts” with its many internal partitions, also the space where “others” are represented and come to be taken possession of by being delivered to visibility. It is the “official” site of the curious hybrids of the pre-moderns, and of technology—for instance, the very categories we find in Clifford’s graph.

This is of no small consequence because, if we follow Latour, the representation of hybrids had to be rendered impossible in order for the modern constitution to work. Perhaps this explains why there was ever belief in the “arts” to have the potential to either transcend and reconcile, or blow up “modernity” from within? But if the “space of art” did not implode the system of modern divisions as if from within, it was because it was circumscribed by a secret contract, a magic circle still inscribed today into institutions of art—the very contract that granted art its relative autonomy, acquired at the price of its worldly consequentiality. Everything that enters into the magic circle has to be removed from the world, removed from direct effect, entering a realm of the merely symbolic, the merely fictional. All objects in the magic circle are given a special ontological status and undergo a process of neutralization through a paradoxical fictionalization. This is what the term “ontological quarantine” designates—in just the same sense that Frederic Jameson has suggested “the aesthetic” to figure as a “safety valve,” “a kind of sandbox to which one consigns all those vague things ... under the heading of the irrational ... [where] they can be monitored and, in case of need, controlled”.<sup>10</sup> Yet on the other hand, this has allowed a unique space of cultural-semiotic reflection to emerge in which certain attitudes and subject-dispositions may be tested and produced, although the passage from the condition of a “test” to reality has ever since been a battlefield.

The very category of art and the aesthetic did not exist as such prior to the emergence of this “settlement”—the very implicit ontological partitions that underlie the status of art and the cultural object in modernity. The contract that brought relative freedom acquired at the price of inconsequentiality is constitutive of the magic circle that surrounds art and its special ontological status in modernity. And this magic circle has, of course, been a major object of contestation, such that much avant-garde history consists of attempts to break the contract, and thereby exit its spell.



Amended diagram of Bruno Latour’s diagram of “The Modern Constitution”.

Indeed the institution of art and the museum, as well as the conceptual designation “aesthetics” has to be situated right in the center of diagram, and hence at an imaginary crossroads of the modern ontological partition: a “Third House” next to “human culture” and “nonhuman nature.” A third house, burdened with the impossible, yet definitely interesting task of purifying not objectivity or subjectivity, matter or mind, society or nature; but whose most noble modern mission (as in the logic of modernism), was to purify mediation and mediality: hence “medium-specificity” as a formula of progress (i.e., purification) in the arts. And of course this paradoxical task would be impossible without

the inexhaustible resource of unpurified mediation-in-excess: hence all modern art history, in the words of Marshal McLuhan, is nothing but a never ending “crescendo of primitivism”.

What happens when this “Third House” is superimposed onto the diagram is a series of more or less predictable as well as surprising correspondences: the upper half of the circle corresponds to the left side of Clifford’s semiotic square—the side of the artistic masterpiece that stands for the subject *par excellence*, and the side of the extraordinary hybrid, the technological invention. On this upper half of the circle, we find museums that reflect the Western “self.” Towards the lower half of the circle, we may locate the museums of “culture,” of the artifact, and the non-modern other; and we may also locate other forms of exhibitions there, such as the commercially circulating hybrid at fairgrounds, the spectacle of the World Expositions, and so forth.

While being overtly schematic, the graph thus has its advantages. It renders comprehensible that—while being internally structured by both schisms whose interplay is, following Latour, at the heart of the modern boundary-regime—the red circle in the middle functions as a unique apparatus in which modernity is believed to be synthesized, and its cleavages can eventually be overcome. This is the reason for the otherwise rather inexplicable investment that brilliant social critics of modernity (from Max Weber and Georg Simmel to Georg Lukács and the Frankfurt theorists to name only a few) made in aesthetics and art—inexplicable, because of the stunning asymmetry of power between the arts and what they saw as their adversary, the divisive instrumental reason and objectivist rationality of the science-and-technology driven modernity whose partitioning of the sense and experience they were critiquing. In this “Third House,” so centrally located, they seemed to believe, the wholeness of experience (as first described by Friedrich Schiller) could be preserved, and one day it would emerge from there not merely as an isolated zone of a shamefully granted autonomy, but regaining sovereignty over life.

The graph also explains why the exhibition is indeed in a privileged place for what I would call a *stereoscopy* of divisions and recursive opposites, in a manner that can come to terms with what Latour has analyzed as the paradoxical “seeing double” of modernity. The exhibition is capable of spatializing these divisions and turning them into topographies of “figures” and “ground.” In the exhibition, the entire realm of figuration and the traffic between the relative poles of subject and object can come into view.

The Latourian graph hence gives a wider context to Clifford's system. It is important to note that Clifford is interested in the mechanisms of representation and the way that they are implicated in the making of the essential boundaries and systems of value-creation in a culture, and the dialectics as well as asymmetries of the self/other. And here, Latour has made a suggestion with far-reaching consequences, yet one I believe is flawed in parts and marks to some extent the limits of his system. This concerns the relation between the "internal" divide of humans and nonhumans that emerges from early modern thought and its relation with what he calls the "external" divide. Latour variously credits Descartes and Galileo Galilei or Thomas Hobbes and Robert Boyle as the origin of the "internal divide," (elsewhere he also suggests it might start with Platonism: there is no theory that can do without the colonization of origins, it seems, and Plato is always a welcome candidate). The internal divide separates humans and nonhumans, corresponding with the standard metaphysical setup of the mind/body dualism. For Latour, the "external divide" which separates European modernity from the primitive other, is the export of the first, internal divide. "In order to understand the Great Divide between Us and Them, we have to go back to that other Great Divide between humans and nonhumans."<sup>11</sup> The colonial frontier, Latour thus practically suggests, is the "export" of the paradoxical internal division: "they" are radically different (pre-modern) because unlike us, they do not separate between nature and culture. Indeed, "For Them, Nature and Society, signs and things, are virtually coextensive. For Us they should never be. Even though we might still recognize in our own societies some fuzzy areas in madness, children, animals, popular culture and women's bodies (Donna Haraway), we believe our duty is to extirpate ourselves from those horrible mixtures."<sup>12</sup> Henceforth, the distance between Europeans and the colonial other will be measured no longer in terms of religion (the right belief), but in the supposedly secular terms of the "modern" and the "primitive": the ability to distinguish between object and subject in certain and not other ways. Given the suggested symmetry of the two "Great Divides," people on the non-modern side would then be subjected to comparable protocols of objectification as a nature rendered objective in the laboratory, and the form of this protocol has been colonial subjugation, and the denial of status of full subjecthood, of being a legitimate subject of rights with a proper "voice." This is how Latour appears to "explain" colonialism, and it may sound convincingly at first. He takes no other origin of colonialism into account, whether from within or outside modern societies. Hence, decolonization, for him, is achieved once we impeach the Cartesian split. Race, gender,

class, and the boundary-making technologies of power that enthroned them, then also seem to disappear without residue. Indeed, for Latour, once the “first divide” is gone, the “second divide” must by necessity dissolve.

This is, in my eyes, the chief defect of Latour’s system, which recently has led him to believe that he could simply pass, with his Actor-Network-Theory, from a “negative” modality to a positive ontology. The problem in Latour’s heuristics is precisely that when they shift from being a heuristic operation and become an ontology, they slip into a homogenous immanence of a seemingly seamless terrain of mediation, lacking a sense for the fault lines of political struggle. That is true philosophically as well as politically, for what has disappeared for Latour once the “bifurcation of nature” is overcome, is also any point from which one could still meaningfully address actual exclusions and asymmetries of power. We are then to enter the “parliament of things”, which Latour quickly asserts to us is not quite like the chatter of an animistic universe, or perhaps a film by Walt Disney. But what has practically disappeared is the sense that the networks are not homogenous, but internally and externally characterized by frontiers. What Latour once described as the asymmetry between “the complex” and “the complicated,” namely the increasing inscription and enrolment of entities into networks and operational chains through making them calculable,<sup>13</sup> constitutes a useful line of argument by means of which one could recover, particularly in light of the rise of algorithmic governance, a critical sense of the frontiers of the present, and the perspective once represented by Max Weber and the like, but without their ignorance of science. The “middle kingdom,” that vast expanse of what he calls “full-blown mediators,” consists primarily for Latour of graphs and inscriptions. They seem to be at the eventful, and yet somehow obscure origin of the mutual constitution of subject and object. While in many of his works what he terms “to follow the actors” turns out to be a narrative strategy tracing shifting relations of the active and the passive, he curiously skips almost completely over the entire question of mimesis: the very terrain where historically, art (and later, the psychology of colonialism) has negotiated with the mediation and the murky vectors of the active and passive, of poesis and pathos, but also of the dialectics of self and other, and of master and slave. But this terrain of enacted, bodily mimesis and psychological identifications disappears behind *scripture* in Latour’s universe. Figurations that are not *written*, practically, have no place in the middle kingdom of Latour’s design, and this overestimation of inscription is what makes him think he can simply move from a critique of modernity to a positive ontology of the network.

Hence, Latour's model tends towards a premature reconciliation, a false reunification across the Great Divides, declaring that we, too, have in reality never been modern, and that we have only now come to recognize this. This is perhaps poignantly expressed through the fantasy of a "second first contact,"<sup>14</sup> suggested by Latour in the immediate aftermath of the events of September 11, 2001; proposing that the former "moderns" and former "pre-moderns" start their politics anew on the grounds of a now revised, a-modern ontology. But who has ever witnessed such second first contact to take place? We can break through this impasse only by reversing the order between the "first" and the "second" divide. The "constitution" was the result of institutionalized practices that have their origin in the coming-into-being of capitalism in the early modern world. We can locate its origins in the early capitalist phase of "primitive accumulation" inside Europe, the witch hunts and the enclosures of common land. And we can trace how with European expansion, a simultaneous "cutting away" of the marginal bodies subjected to negative projections occurs. Then we realize that the "denial of recognition" of which Latour speaks with regards to the nonhuman has its origins in political reorganization and conquest at the dawn of capitalism, and that this "denial" had from the outset, at its extreme, a genocidal face; that in fact, the "Great Divide" that characterized modern European relations to the rest of the world, and the argumentation with regard to universality that informed the latest debates on human rights and the right of intervention, have their roots in early modern conflicts that reverberate to this day. An important dimension of this lineage is the medieval debate over whether non-European people had "dominion"—that is, property in their persons, goods and lands. In 1454, a papal bull declared that all non-Christian peoples had no ownership rights to the land on which they are living, and gave the King of Portugal the right to invade and conquer, convert forcibly and enslave, dispossess, expel, and ultimately, to kill those that failed to accept the truth, convert and be colonized.<sup>15</sup> This provided a long-lasting resource forging a consensus around the justification for colonialism. In *Two Treatises on Government*, the seventeenth-century British thinker John Locke argued that the use and exploitation of land is the criteria for rights to property, and since the natives did not exploit their surroundings as Europeans would, colonization was justified. The intimate relation between the modern self and its relation to property (previously called "dominion") certainly present a fertile line of inquiry that has not nearly been exhausted to the full, just as the inquiry into the exhibition as a "Third House" provides ground for a re-narrativization of art histories as part of the larger disciplinary and ontological partitions and their current unmaking.

## Footnotes

1. Bruno Latour. *We Have Never Been Modern*. Cambridge, MA: Harvard University Press, 1993. Print.
2. James Clifford. *The Predicament of Culture: Twentieth Century Ethnography Literature and Art*. Cambridge, MA: Harvard University Press, 1988. 223-224. Print.
3. Bruno Latour. Op. cit. 82.
4. Ibid. 48.
5. Ibid. 37.
6. Ibid. 34.
7. Bruno Latour and Peter Weibel. *ICONOCLASH: Beyond the Image Wars in Science, Religion and Art*. ZKM; MIT Press, 2002. Print.
8. Thomas Keenan. "Photography and Counter-Forensics." *Grey Room* 55 (2014). Print. And *FORENSIS: The Architecture of Public Truth*. Eds. Eyal Weizman, et al. Berlin: Sternberg Press, 2014. Print.
9. See Georg Simmel. "Rodin." *Philosophische Kultur: Über das Abenteuer; die Geschlechter und die Krise der Moderne* (1911). Berlin: Wagenbach, 1983. 151-65. Print.
10. Fredric Jameson. *Late Marxism: Adorno, or the Persistence of the Dialectic*. New York: Verso, 1990. 232. Print.
11. Bruno Latour. *We Have Never Been Modern*. Op. cit. 97.
12. Ibid. 99-100.
13. "Complex relations force us to take into account simultaneously a large number of variables without being able to calculate their numbers exactly nor to record that count, nor, a fortiori, to define its variables. The lively and animated conversation we're attempting, leaning on a bar counter, is complex, as is the course of a ball and the play of football teams in a match, or the fine coordination through which an orchestra listens to or filters the emanation of each instrument and voice. By contrast, we'll call 'complicated' all those relations which, at any given point, consider only a very small number of varieties that can be listed and counted." Bruno Latour and Emilie Hermant. *Paris, Ville invisible*. Paris: La Découverte, 1998. Print.
14. Bruno Latour. *War of the Worlds: What about Peace?* Chicago: Prickly Paradigm Press, 2002. Print.
15. V. Y. Mudimbe. *The Idea of Africa*. London: James Currey, 1994. Print.

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JOURNAL > SITE 0: CASTALIA, THE GAME OF ENDS AND MEANS | 2016

## Forging Rules: Glass Bead in Conversation with Keller Easterling and Benedict Singleton

Benedict Singleton,

Keller Easterling

It is common to consider architects and designers as opportunistic figures consorting with the industrial, financial and political powers in place. From this standpoint, their alliance to critical voices and to potentially emancipatory ends is often seen to be rather dubious. This critical characterisation has however been increasingly challenged by authors and practitioners who argue that playing with the rules of the game, manipulating things from within, diverting and subverting various power agendas, could be more productive critical strategies than direct opposition. Informed today by the debates emerging around accelerationism and theories of the common, critical strategies may come closer to the multiple meanings of forging. At once shaping a metal object by heating it and hammering it, constructing, by extension, something that is strong, enduring or simply successful, as well as falsifying, imitating, producing a copy of something in order to turn it into something else. Keller Easterling and Benedict Singleton joined us by email to discuss how their respective work related to such ideas and strategies.

Glass Bead: Keller, as an architect who is predominantly engaged in doing research and making exhibitions, you've argued, in your last two books, that architecture has more to learn than to teach about global politics and global urbanization. Benedict, you've engaged in a massive effort to philosophically reconceptualize what design is and can do,

yet you define yourself less as a theorist than as a strategist. Could you both tell us more about how this relation between the practical and theoretical dimensions of architecture and design unfolds in your respective practices?

**Keller Easterling:** I am sure I have said that, with regard to global politics, architecture has more to learn than to teach. And yet, so much of my work at present is about making palpable the spatial operating system of global development. I am trying to unfocus eyes to see not only buildings with shapes and outlines but also the matrix of activities and rules in which those buildings are suspended. This operating system is largely coded with econometrics by 28-year-old McKinsey consultants, World Bank yes men and commercial orgmen. Spatial expertise—spatial variables that embody intelligence, economy and social justice—is sorely lacking in global governance. Still, the most interesting thinkers in the social and political sciences are looking for a more complex context in which to test their master narratives and the authority of their supposed science. In a book published this year, *Extrastatecraft*, I am offering global infrastructure space as a valuable testbed for these inquiries.

While unfocusing eyes, I am also trying to change a habit of mind about form making and political activism. We are very good at “knowing that”—pointing to things and calling their name. In our most primitive moments we even regard this cumulative identification as a primary form of knowledge. But, with a tip of the hat to Gilbert Ryle, “knowing how” redoubles that knowledge. It is the ability to detect the unfolding interplay between things as an information system. We are accustomed to the abstractions of information systems—languages, DNA, or codes for digital devices. But we are less attuned to the ways in which information resides in the lumpy, heavy objects of our world—not only living beings but everything from the smallest object to buildings and cities. We are more aware of their name than the repertoire they enact. It is harder to see the ways in which objects are exchanging and generating information.

I am trying to demonstrate the ways in which the urban space of the city itself is an information system and a portfolio of values more tangible than the often risky abstractions of the global financial industry. Cities don’t have to be coated with sensors to be complex networks and routers. Cities, the buildings and people in cities “compute.” And urban relationships and practices constitute a set of assets.

*Extrastatecraft* rehearses the ability to read this matrix space as an infinitive rather than nominative expression. In addition to the object forms that designers are trained to make, the book considers the active forms that shape complex unfolding dispositions in the city. It's a longer discussion, but, in this extra dimension or part of speech, form can be indeterminate to be both more practical and more politically vigilant.



Watchdogs, Screenshot gameplay (Ubisoft, 2014)

**Benedict Singleton:** For my part, I'm a designer, by trade and inclination. I spend much of my time working "in industry," as we say—interaction design, service design, platform design. Design always has a certain theoretical component: ideas arise in the course of making something that can be redeployed, even if it's just in making the next thing. But these ideas are probably made a little more explicit in my area, as it's a terrain for design that is—relatively speaking—fairly new, and therefore underspecified. We are still trying to work out the basics of what it is we're doing. And this tendency to abstraction is reinforced further because my role, over the last ten or so years, has increasingly tended towards the strategic. I find myself more often with the job of working out what might be done, and how, than delivering a finished artifact.

So I have a professional interest in ideas that unlock new ways to proceed in a given situation: understanding how things *really* work in order to produce an effect; the relations—actual and possible—that design has with outside forces that set and are unset

by its agendas; and so on. Given their proximity to practice, I tend to value these ideas more for their efficacy than by their claims to being comprehensive; I'm more interested in diversifying possible courses of action than of creating a "theory of design."

Yet, certainly, themes coalesce. Perhaps the major one for me has been a view of design as something innately subversive: design is really what you do when you can't straightforwardly impress a pattern on the world, but must rather devise a sequence of oblique and well-timed actions in order to coax effects from unpromising materials—materials that are remote, volatile, stubborn, obscure, or otherwise resistant to manipulation. I would like to think that this has some valence outside design, too, not least because, of course, situations of this type are familiar from our daily lives. Perhaps design, as a field, can help us provide a language for—or maybe I should say, *a geometry of*—such scenarios, a task with which the official canon of Western thought has not, it appears, been much concerned.

Over the past few years, a more significant fraction of my time has become dedicated to exploring these ideas *in themselves*, taking tools I use in my broader work—design, but also writing and latterly film—into spaces better suited to expeditions of this sort. Fiction, the gallery, *et cetera*. I like the idea of making art in which people whose lives are spent getting things done, be they tradespeople, board directors, busy single mothers, whoever, can see recognized and reflected the intelligence at work in what they do.

GB: It appears quite evident in what you are saying that, in order to rethink architecture and design, in order to expand their understanding beyond buildings and beyond what can be called a "solving problems" logic, it is necessary to rethink the type of spatiality in which they intervene, and the spatial logics in which they can engage. By focusing on Castalia, we similarly wanted to emphasize, in this issue, the spatial and institutional dimensions of The Glass Bead Game. Once we understand Castalia as the site where the game is played, it becomes possible to underline that the limits of the logic of the game are also related to problems and limitations that are associated with both the modern (i.e., extraterritoriality) and the postmodern (i.e., localism, particularism) understandings of the concept of site. Both of your projects deal quite extensively with this concept, or at least with related questions and problems. Could you explain how your respective projects relate to such a critical and speculative engagement with the notion of site, and how do you see the specific role that architecture and design can play in moving away from the endless dialectical play between extraterritoriality and localism?

BS: If you trace the conceptual history of ‘plot’, you find that before around 1500, the term refers solely to a marked-out site, an area of land. Over the next century or so, the term’s meanings proliferate to the point where their connections are no longer immediately obvious: drawings, narratives, and seditious plans are all called plots. The underlying logic that guided this development illuminates an alternative conception of design in a very striking way.

Plot’s initial, *spatial* meaning, the demarcation of an area, transferred into the language of the workshop. One plots out a design on paper before acting on other, more expensive materials. So a *constructive* sense of plot arises, relating to diagrams, maps and charts. And within a few decades, this graphical ‘plotting’ was adopted into the lexicon of the early modern theater, where its artisanal meaning deepened into a *narrative* sense: plotting as the arrangement of people and things over time, so as to tell a story.

Up to this point, ‘plot’ shares a substantial similarity to ‘plan’. Both words couple the idea of a spatial arrangement with a schedule of unfolding action. Plot’s connection to territory (and the politics of its division), cartography, and stories make it, perhaps, the richer word. But most interesting is that, on the back of its theatrical use, plot acquired a further, specifically *subversive*, sense, which planning does not possess: plotting as the subtle orchestrations of an unseen director, manipulating the course of events from behind the scenes.

So ‘plot’ encodes a particular form of creativity, too, which can be glossed as the production of a *plot twist*. This is the point at which one plot is subverted by another one, just as the routines of the bank, the placement of cameras, the structure of the vault and the peccadilloes of the manager become the raw material of the heist. Put another way, plotting is always *re*-plotting: discerning the contours of an unfolding situation and locating the opportunities it presents for ‘leverage’—points in space and time at which an action can generate an effect disproportionate to the physical effort put into it. A plot, we might say, is a plan invested with this kind of underdog intelligence.

In a kind of closing of the circle, ‘site’ (the original meaning of plot) remains critical to this idea of the creative twist or what we might call *the kick*—the moment where one plot is derailed by another. Rather than conjuring an image of how the world should be and then trying to force it into being, plotting takes a site’s particular structure, its fixity or at least predictability, as the platform for new and potentially unlicensed operations. Recovering the full sense of plotting, as an intervention that starts from a point of

comparative weakness and proceeds through guile and ingenuity, forges a deep conceptual link between the creation of artifacts and political intrigues, dissident stratagems, and other ruses.

KE: I am not just being churlish when I say that, if asked whether I was more nourished by Herman Hesse or an especially gifted confidence man, I would have to go with the latter. As is probably clear from both *Enduring Innocence* and *Extrastatecraft*, like Erving Goffman, I learn from discrepant characters—pirates, swindlers and others who have mastered the art of decoupling what they are saying from what they are doing. (There are sympathies with Benedict here surely, and discussions of “The Long Con,” the title of one of his essays, even appears in my writing as well.) Perhaps the only thing of note that I bring to the study of space is a training in theater where this decoupling is routine—as is the understanding that actions are primary carriers of information. (The line is “Come home, son,” but the consequential information is carried in the action played—to reject, to grovel or to smother.) It is this perhaps deceptively simple skill that is useful for designers in a world of stealthy politics.

For both designers and activists, the forthright, the direct, the sincere is often valued over the discrepant and the sly. But learning from Rosalind Williams and others, the formulas and spatial products of infrastructure space are nowhere in particular. Infrastructure space is a distributed condition organized by mixtures of state and non-state players. Some years ago, I designed “site plans” for spatial products that were something like a slide rule with the north arrow spinning. There is no place and there is no guarantee that the righteous duel of the activist or the directness of the designer address will register change.

These are networks of spaces where remote controls, switches and multipliers are better as active forms. As Gregory Bateson said, “A switch is a thing that is not.” Active forms are not finished but dispositional and unfolding in time. There is no object or master plan but something more like the identification of linkages and interdependencies that remain in place to counterbalance each other. Maybe then, there is a chance of pacing with the shifting disguises and turnabouts that every sneaky player in the world tries to get away with—design as a snaking chain of moves that can gradually get leverage in difficult political situations. That is what I meant by referring to the indeterminate as both more practical and more politically vigilant.



Chic Point: Fashion for Israeli Checkpoints. (Sharif Waked, 2003)

GB: You both talk about figures and strategies that seem to have a lot to do with the notion of game: the especially gifted confidence man, the pirate, as well as dissident stratagems, and other ingenuous ruses... But how do you see in relation to ethical questions? It seems that, in order to avoid some kind of cynical free play so commonly praised nowadays, we need to be able to draw a line between mastering the game and being able to transform its rules...

KE: “Mastering the game” in this context sounds a bit like “working from within”—the idea that one plays along on the inside of an organization in order to figure out how to eventually manipulate it. I don’t see the techniques that Ben and I explore as necessarily conducted “from within.” Maybe there is no possibility of working “from the outside,” but I still labor under the assumption that one can manipulate without collusion. Ethics travels along a Möbius strip of meanings sometimes on opposite sides of the same surface and approaching from different directions. For some, it describes the maintenance of consensus around stated principles. I am temperamentally uncomfortable with this hope for a steady-state and better disposed to ethics as the

maintenance of dissensus around a necessarily indeterminate struggle with circumstance and evidence. One notion of ethics operates in a declarative register and the other in an active register. Maybe the word indeterminate is a stumbling block because it signals to some equivocation, lack of conviction or the “cynical free play” to which you refer in your question. Here is a quote from *Extrastatecraft*:

*...Any deviation from the proper techniques, even in an attempt to aid and broaden activism, may be interpreted as a betrayal of ethical principles. Manipulating the market is mistaken for collusion. Giving positive attention to agents of systemic change rather than negative opposition to a series of enemies is mistaken for an uncritical stance. Relinquishing the grip of resistance is mistaken for capitulation or ethical relativism. Answering duplicity with duplicity is mistaken for equivocation or lack of conviction rather than a technique to avoid disclosing a deliberate strategy.<sup>1</sup>*

But, for me, indeterminate only refers to situations that are dispositional or time-released. Also the most powerful players in the world rely on indeterminacy, so that, in the winding road of political manipulation, they can be Goliath one day and David the next. The notion that there is an ethical consensus and proper realm of political negotiation plays into the hands of this elusive behavior. It is easy to trick dissent if declaration is the only thing that counts and information. And squaring off against these powers often means that you are either escalating the tensions or violence that you want to diminish or shaking your fist at a ghost. To acknowledge an indeterminate and changing set of techniques is to stay light on your feet and exercise the same political agility that the most powerful characters enjoy. You can never congratulate yourself for being finished. You can only start a ratcheting interplay that gains advantage over the abuses of concentrations of power.

BS: If it's a type of game we're talking about—and it's an odd type of game indeed when one competes for the right to set the rules—it's premised on seduction. We're all familiar with the tale of the detective who goes too far. They pursue the criminal, trying to piece together fragments of evidence into a trajectory, so that they can intercept their prey—supposedly to enact justice, and restore order. But of course they target the criminal just as the criminal entrapped *their* victim, and in the classic cat-and-mouse set up, the criminal must think like the detective, the detective like the criminal... Their identities first synchronize and then converge as the situation escalates. From what we might call *a plot's-eye view*, these apparent adversaries are complicit in the propagation of the plot itself, which grows in sophistication with every twist. Noir, especially, is sensitive to this crossing of lines: the corrupt cop, the principled thief.

There is sometimes a blackly comic aspect to being drawn into the whirlpool in this way. In the UK, as I write this, a highly professionalized system of public politics—very slick, very cruel—is trying to reckon with the advent of Jeremy Corbyn: a figure by all accounts as straightforward, unrefined, and honest as they come. Neither his fellow politicians nor the media seem to know what to do; to their evident rage, every attack they launch seems only to bolster his popularity. Is this the start of a new game, or simply a knight’s move in the old one? As ever, we will have to see. But it provides a topical example of how becoming attuned to the rules of a very complex game indeed, becoming a player of great skill, can *itself* be a set of blinkers, and, under the right circumstances, a terminal flaw. I’m very interested in how we might train ourselves to understand these *actual operations of the political* in a different light: a politics of the gyre, as it were. As Keller suggests, apparent errors in the established script can function as footholds for other forms of action. When we see our ideals flounder in practice, there’s a temptation to fall back on simply affirming them anew; maybe if we refine the way we phrase them just one more time, we’ll have found the correct combination for the safe that’s rumored to contain a better world. Clearly that doesn’t often work, and other approaches are necessary. But a more subtle temptation is to see the exploitation of these apparent discrepancies simply as opportunities to bring down The System, which can then be forgotten once we’ve replaced it with The Better System. As noble as the envisioned substitute might seem, it, too, will come with its side-effects, backfires, and off-label uses... We need a *gyropolitics* capable of reckoning fully with these complex reversals, escalators and complicities.

GB: Keller, although you focus on global infrastructure space and on depicting the operational formulas that shape global urbanization, you also often talk about cities. Here you even say that, once considered as an information system and a portfolio of values, the city remains a more tangible site than the abstractions of the global financial industry. Benedict, the schematic history of the notion of plot that you propose could be read in parallel to that of the city. Largely drawing on the ideas developed by Henri Lefebvre in *The Urban Revolution* ([1970] 2003), several authors are arguing today that cities have been completely absorbed by at once more continuous and more heterogeneous forms of urbanization. It seems clear that cities are no longer the bound topographical entities that they once were, surrounded by walls or delimited by clear administrative and morphological boundaries. However, this does not necessarily mean that they are not topological singularities that must be reckoned with. Do you think

cities are still strategic places architecture and design should engage with? Or do you consider that we are past that? And that the city has been diluted in global processes that unfold at different levels?

KE: I used the word “city” to describe urbanity as it assumes various forms and intensities. Because I am looking at space itself as an information system, I am trying to assess when urban dispositions are information rich or information poor. Those urban dispositions might be at the scale of a huge conurbation, a rural village or a distended suburb. Beyond access to digital information systems, I am working on access to information-rich spatial technologies. Urbanity is perhaps also for me, the condition capable of introducing errors into any organization or formation—error and contradictory information that continues to grow information in ways that are irreducible.

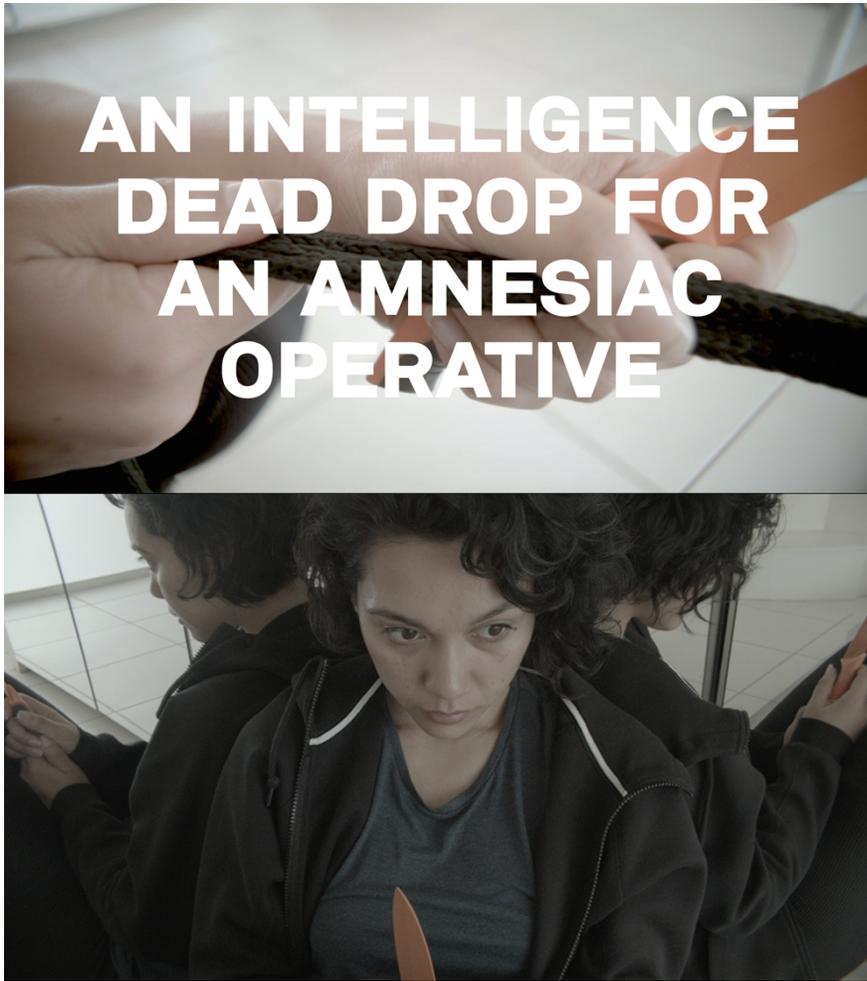
BS: Keller’s talk of McKinsey consultants and World Bank orgmen as vectors of contemporary urban forms makes me think of the city as a zone of *deals*. Discussed in the terms of the economic theories favored by such agents, the deal is framed as a matter of mutual benefit, self-interest, fair exchange; but it appears quite differently when refracted through the kinds of ideas I’ve previously outlined.

I’m reminded of the strikingly original way that the anthropologist Mary Helms, whose work has been an abiding influence on my own, describes a level at which design and trade become equivalent. Rather than assuming the former simply provides the material for the latter, the two practices become comparable when they’re seen as acts of negotiating an ambiguous environment, one traversed by complex and partially concealed forces, in order to procure an object. Put very simply, the intelligence with which the artisan approaches their materials is mirrored in the art of dealing with strangers in the marketplace. In this link we can observe how design grades into the soft power of branding and diplomacy, but we can pursue the connection further with regard to the deal, I think.

The deal is a commitment or pledge to which you will be held by exterior forces, in this case at least one other person. The agreement that finds expression in a deal, whether it is as a signatory on paper or registered in a shared glance (neither is necessarily the more binding), is an explicit alignment of multiple agendas. This fixes a degree of predictability in the articulated relationship—an alliance, however brief, which in turn can be built on by all concerned. But the full range of this pact’s ramifications is not given in advance, and the real terms of a deal might only become visible later, as its ultimate implications

begin to surface—perhaps in ways to be celebrated, perhaps not. I’m fond of the way a deal’s basic structure, and the dawning awareness of its delayed implications, are both compacted into the phrase *shaking hands*.

Cities are the psychological epicenter of this procedure, the place where deals proliferate and stakes become extravagant. They are accordingly rich with typologies of ascent and shipwreck, trouble and oasis. This quality seems inherent to the city. Its enduring richness as a model of the maximally artificial environment, compared to say the submarine or spaceship, is not just a function of its scale and heterogeneity. These latter qualities are themselves a function of the city’s generative paradox: a bounded space, but open to the outside; a stable zone, but predicated on arrivals and departures. Such an environment is configured to continually test expectations. Think of the marketplace, where deals are done with figures from afar, whose motives may be as dubious as their standards are unfamiliar, and are prone to disappear when called upon to uphold their side of the bargain. Indeed, Helms writes of the historical and geographical frequency with which this quality of urban marketplaces has been extrapolated into rumors that they are *haunted*, comprising a gateway to the unfamiliar Outside—where nothing can be relied upon to be as it seems—situated at the heart of a settlement. Although stated in very different—and far more abstract—terms, I suspect the reconceptualization of the market by the philosopher of finance Elie Ayache runs along compatible lines: the market not primarily as a zone of exchange, but the mechanism that resets our models of the world. “The medium of contingency,” as he calls this proving-ground. The city as the substrate and product of this medium has yet to be explored.



Still and Unedited production screencap from *The Last Girl Scout*, 3 min (Benedict Singleton & Brian Rogers, 2015)

GB: We would like to end this interview by moving from the city to outer space exploration. Space traveling design seems stuck in a contradictory movement: while it aims to conceive of ways to displace life in radically foreign contexts, this move tends to preserve the exact same conditions of life as those we know on Earth. In this context, outer space exploration seems caught in a logic of colonization: a logic of spatial expansion that relies on the preservation of the same. Here an obvious image comes to mind: the end sequence of the recent movie *Interstellar* and its outer space replica of the American Midwest.

Just as the growth of the city triggers discontinuous scaling phenomena which irreversibly transform its identity, truly leaving the earth would imply, in the long run, exposure to conditions which would inevitably de-nature what we are.

How can your respective conceptions of design help us in thinking of such a form of

deracination? In other words, to what extent can an engagement with such contingencies really break with the logic of continuity that you describe? Or, can we think of and construct new articulations between contingencies and continuities?

KE: I am a very poor interlocutor for questions like this. I recognize that I must be one of the few human or non-human beings who are bored with science fiction about manned space travel (as opposed to space exploration). Maybe it is because the stories often have conservative templates or formulas into which supposedly fantastic and sensational material is poured. Your question may even reflect this. Maybe it is the predictably anomic anti-heroes who are a bit of a turnoff. Maybe the whole atmosphere of newness also seems to align with or reinforce our larger cultural mistakes about the advent of new technologies—anticipation of either the dystopian crisis or the redemptive universal platform for exchange. Are these the melodramas of the teenaged or the middle-aged? I am not sure. But I have the sense that they predetermine expectations about a human mind in interplay with conditions like space travel. While I know very well that sci-fi imaginaries can be nourishing, I stubbornly find dyspeptic some affect surrounding the form. It reminds me of a toupee.

BS: A toupee—what a delightful image! And apt. I share Keller's distaste for these acts of gussying-up, in which outer space becomes the glittering backdrop for narratives that wouldn't be out of place in 19th century fiction. Of course, science fiction is a sophisticated field, and exceptions are, mercifully, easy to find. But the general tendency remains common, and colors, too—the reception of real-world initiatives.

I've written elsewhere of ditching this intrepid naval heroism in favor of something more interesting. Space exploration renders in hyperbolic form a circuit of frontier exploration, technological invention, and the stretching of intelligence in the face of the new—a loop present in other narratives concerned with the breach of apparently insurmountable obstacles, in defiance of a received view of the odds: the prison break, the heist, the con job, and so on. Maybe more of conceptual sustenance can be recovered from investigating this connection than yet another clumsily retrofit of advanced tech onto the frame of a *Boy's Own* adventure.

My most recent self-directed work has followed this hunch, especially in a collection of stories called *Character Set*, serialized in the magazine *After Us*. *CS* is an experiment in actively developing popular cultural archetypes fit for the 21st century: a kind of “platform fiction”—the production of a sourcebook or manual that gives more distinct form to figures around us which are, as yet, only dimly sketched.

The first few stories develop a concept that initially emerged in a film piece I directed with the artist Brian Rogers for the Tate earlier this year. We wanted to make a cinematic portrait of a *final girl* figure (sole survivor of so many B-movies) focused on how she so often fashions her escape by building an improvised machine, a trope that gives the piece its title, *The Last Girl Scout*. We were interested in how she represents a kind of alternative origin story of technology: the figure engaged in the million moments of invention that are elided at the start of *2001* in the famous smash-cut from club-wielding protohuman to spaceship.

The first *CS* story developed this figure further; the second explicitly takes up Kubrick and Clarke's enigmatic monolith, rewriting it as a fugitive, mobile and distributed structure, bootstrapping itself into existence. Its contours only ever glimpsed in certain kinds of thought, talk and action, *this* monolith is ultimately pitched as a speculative megastructure that comprises every crime ever committed. The common element in every transgression of the status quo, it constitutes a kind of network of secret passageways through time: as such, any scenario that witnesses a visitation by the monolith is rendered at once incredibly ancient and entirely futuristic. The third story will be about "the straw astronaut," extending this line of thinking into the question of "what is the thing in the spacesuit." Its protagonist is a scientist commissioning the heist of a disputed archaeological find, believed to be the bones of the first tool-using hominids, from a bank vault (making the story a kind of cross between *Quatermass and the Pit* and *Heat*); in the process, he has cause to reflect on how millions of years of just this kind of guileful operation have transformed our anatomy and cognition—because insofar as we are redesigning things around us, they are also, subtly but on an accelerating timetable, redesigning us.

Interview conducted for Glass Bead by Fabien Giraud and Jeremy Lecomte.

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## Footnotes

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Benedict Singleton is a strategist with a background in design and philosophy based and working in London.

Keller Easterling is an architect, writer and professor at Yale University.

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## The Consequences of Philosophy

Giuseppe Longo

*“In the transition from consciousness to reality, the ego, the thou and the world arise into existence indissolubly connected and, as it were, at a stroke.”<sup>1</sup>*

### The Line without Thickness and Money

The “Big Bang” of Western mathematics dates from Euclid’s definition β: a line is a length without thickness. This invention connects mathematics with Myth while proposing new forms of knowledge, and it organizes human space by separating the visible from the invisible, extracting Platonic Ideas from the world. In his *Confessions*, Saint Augustine recalls that even the filament of a spider’s web has thickness; so it is impossible to draw this idea of a line from sensory experience—God enables us to know this mathematical structure by inscribing it in our memory. Yet without adopting a hypothesis pertaining to absolutes, we may reconstruct the entirely human symbolic gesture that inaugurates the invention of the line without thickness. The latter is merely a boundary cutting out the figures of Greek geometrical lines, pushing to the limit the feature by which our ancestors in Lascaux drew bison composed solely of lines and contours, in which only humans can see the silhouette of an animal.



Ancien Greek Coin, Phocaea, 5th Century BC. Photo Credit: Doug Smith

Philosophy, mathematics, and metal currency were born almost simultaneously in Ionia between the seventh and sixth centuries BCE.<sup>2</sup> These three practices each bear new forms of thought and social life. The invention of money implies categorization—a generalized equivalence, Marx and Keynes would say—which is linked to what philosophy does. As regards mathematics, the Euclidian axiomatic demonstration—this product of the *agora*—is as important as the invention of purely ideal structures, such as the line and the point, which organize and measure the world, while existing solely in language and in the *gesture*. Ideas are grasped through gestural practices, trajectories in space that show (*montrer*) the *demonstration* through movements of traced points and lines. The theorem comes from *theorein*, a “seeing” that refers to “showing”, on the model of the *theater*, where we access to “ideas” through the viewing of mythic events. Among these mathematical “ideas,” the line as the trace of a continuous gesture is a fundamental notion: the point (*semeion*) is at the extremity of a segment (definition  $\gamma$ ) and is apprehended, according to Euclid (Theorem I, Book I) as the sign of a position on a

line or an intersection of two lines. The point is not the fundamental entity: from a spatial-geometrical point of view, it is not the line that is composed of points, but it is the point that is the sign-trace of relations and movements of which the line is the support. All the figures of Greek geometry are composed of continuous lines and their intersections. On the one hand, figures constituted of lines without thickness make it possible to calculate surfaces; on the other hand, the ideality of the line, a limit notion, explains the eruption of the irrational (*alogos*) into the calculation of finite figures. The geometry of “pure” lines exceeds the arithmetic *logos* and organizes the world through relations of reciprocal determination between abstract diagrams rooted in humanity’s gestural and figural experiences—experiences to which the bison of Lascaux are a testament. Coin currency also institutes abstract relations of equivalence between objects that are fixed in symbolic writing (the value of the first coins was marked by geometric figures and by their combinations). This relation between geometry and ideality—between abstraction and figural vision—also governs Greek philosophy, the fundamental notion of which is the *eidōs*, the Idea.

### **Uniform Rectilinear Movement**

Thanks to a gesture just as audacious as Euclid’s, Galileo introduced into physics the principle of inertia as the fundamental principle of conservation (the quantity of movement). Galileo’s principle constituted a shift to the limit: since perfect inertia does not exist in the world but rather is an external limit, then Galileo, ideally situated on the horizon of all movements, can make them all intelligible as modifications of an ideal limit-state. In the Italian Renaissance, the infinite-ideal encounters the finite—i.e., human—world and natural processes. This revolutionary encounter became a prime theme in the great medieval theological debates,<sup>3</sup> but its spatial representation would arise in the pictorial theology of the *Annunciations*—the decisive site of the invention of linear perspective.<sup>4</sup> At the start of the fifteenth century, the presence of divine infinity within the finitude of a woman—the Virgin—is symbolized by the inscription within the painting of a perspective point where the lines converge “on infinity.” Later, Nicolas de Cues and Giordano Bruno plunged humanity into a God-Nature infinity that expressed a new view of the human condition: a gaze from infinity that reconciles humanity and divinity, ideality and spatiality—just like the *Annunciations* articulate the infinitude of God with the corporality of the human creature.



Piero della Francesca, The Annunciation to Mary, c. 1455, fresco, 329 x 193 cm, San Francesco, Arezzo

Renaissance pictorial art is the prime site that plunges figures into a spatial-geometric infinity: according to Pomponius Gauricus, the artist should draw space on the canvas before situating the bodies there.<sup>5</sup> Piero della Francesca is faithful to this principle, whereas with Paolo Uccello and Ambrogio Lorenzetti the geometry of pictorial space follows upon the event depicted. But in both cases, it is geometry that organizes the event, by giving it a visible and signifying structure. Shortly thereafter, mathematics and physics (with Descartes, Desargues, Leibniz, and Newton) embarked on an analogous journey, rendering intelligible the forms and movements of *finite* material bodies through *infinite* principles-limits.

## The Invention of Mathematical Space

If the geometrical organization of pictorial space becomes inseparable from the constitution of figures and events, the geometric organization of space in physics becomes inseparable from the constitution of trajectories, which the Aristotelian vision studied as if they were independent and isolated phenomena. From Descartes to Newton, the space preexisting trajectories is constituted as an a priori structure, which Kant would turn into a principle—no longer of the real, but of knowledge. But this preexisting structure of cognition has generally been considered as an ontological reality. Thus there developed an implicit Platonism that turns equations, functions, forms of writing and of being, into ideal things that precede the world—a spontaneous ideology that is found in biology in the metaphor of DNA as a “code” preceding and containing the organism, just as God (or evolution) “programmed” it. The birth of ontology implicit to the Renaissance is also over-determined by the invention of paper money, which is a subsequent phase in the process of abstraction of value and of social relations.<sup>6</sup> The complex articulations between myth, theology, and the formation of scientific thinking constitute the object of historical epistemology. However, the various “spontaneous” Platonisms that continue to exist in the philosophy of mathematics refuse this “gap,” this distanciation, that enables epistemological reflection: they reify the constituent human gestures, theological and mathematical, by which the world is rendered intelligible. In reality, the line without thickness, the point-sign, linear perspective, and space given a priori are all merely non-arbitrary constructions, engendered by concrete practices rubbing up against a “real,” which by its constraints channels our knowledge operations. But these constructions whose dominant traits are immateriality and mathematic invariance—and whose power arises from not only their great efficacy in mathematics and physics, but also from their mythical and theological origins—are completely inadequate for the biological field. It is this inadequacy that links the epistemological problem to the current orientation of our work.

### Intermezzo: *Existence and Truth*

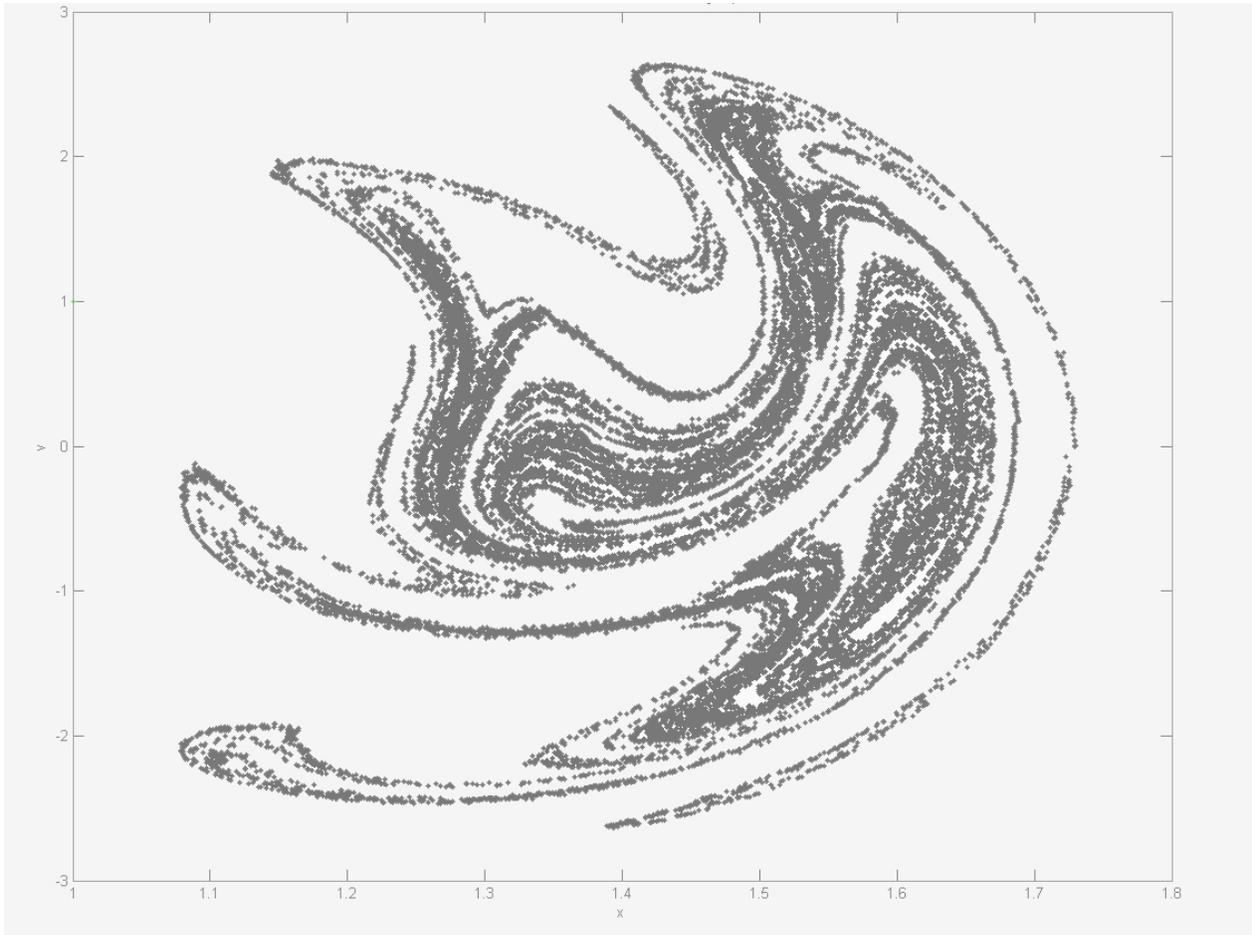
Any discourse on the “existence” of a mathematical structure (like the line without thickness) misses the problematic of the constitutive gesture. Not only does study of the brain show that the latter imposes boundaries on objects,<sup>7</sup> but the organization of the world into continuous lines also arises from the organism’s primary gestures, starting with the circle of retention-protention.<sup>8</sup> But these biological structures do *not* already

contain the concepts of line and border: they are merely the *conditions of possibility* of a primary relation to the world that language, drawing, and writing organize conceptually on the basis of the gesture of drawing figures on a rock.

It is impossible to subject the principle of inertia to empirical verification, which would require realizing in the world an absolute absence of forces. We are dealing with organizing principles that arise from a praxis that allows us to regard the world from a shift to the limit. The mathematical structures issuing from a long scientific and theological history may nevertheless be modified through confrontation with the constraints of the real: this is the case with Relativity, where the Riemannian form of space, unifying inertia and gravitation, is ultimately the fruit of a reorganization imposed by the observed invariance of the speed of light. The power of symbolic constructions<sup>9</sup> as well as shifts to the limit allow us to apprehend the finite from the *a-logos*, and the *a-peiron* continues to support the construction of our knowledge of the physical world. However, the question arises of whether these principles enable us to grasp the historicity and variability of what is living.

### ***Space and Laws***

It was only in the eighteenth century that the term “law” came to predominate in the vocabulary of the sciences—a projection onto nature of divine law, and according to some, of the law emanating from absolute monarchies.<sup>10</sup> There is a link between the takeoff of a notion of law in the natural sciences and the invention of space. The idea of physical laws does not become a rigorous notion until it is formulated in the form of equations, which is only possible thanks to the construction of the a priori structures that are space and time, conditions of the possibility of physical and mathematical knowledge. For the regularities of nature to become “laws,” they have to be written in the form of equations or as functions of evolution, and to do this, it is necessary to construct an a priori space of mathematical inscription (spatiotemporal parameters). Mathematical physics in the nineteenth century would extend the Cartesian space of Newton, Lagrange, and Laplace into the space of phases, i.e., a framework given in advance as a condition of possibility of the determination by equations of geodesics—that is to say, optimal trajectories into the considered space. This framework remains an a priori condition even when the determination of trajectories proves incomplete, and when the formalism of equations describing the trajectories leads to the unpredictability of a determinist type, as in Poincaré’s resolution of the three-body problem, which destroyed Laplace’s myth of complete determination.<sup>11</sup>



Poincaré plot of Chaotic Pendulum Activity (Single Phase)

In the nineteenth century, positivism repressed the theological and metaphysical origin of the “laws of nature” and attributed to them the power to totally regulate human actions. From these illusory postulates derived the catastrophic failure of the theories of economic equilibrium, which Poincaré had already demolished in a letter to Léon Walras. But the idea still persists today that economic processes correspond to a Walrassian dynamic, which spontaneously engenders an optimal state when it is not disturbed by exterior interventions. Here we are dealing with a metaphysics of power that considers society as an ensemble of rational individuals who are each aiming at the maximization of profit, and whose interactions produce a spontaneous social order, regardless of communication among people and their capacity to construct a common world. This metaphysics implies the idea that people can and should be governed by the laws of numbers, the techniques of calculation, and the norms spontaneously engendered by the statistical treatment of data. This principle is affirmed in a universal normalization of any policy—economic, political, and scientific—by its statistical results, which end up rendering superfluous and negligible both the singular variation and the

qualitative decision. The normativity of statistical data completely forgets that the decisive moments in the history of scientific thought have involved radical metaphysical decisions and a new articulation between the regularities of the real, on the one hand, and mathematical ideality on the other. The decision to organize space on the basis of lines without thickness, to look at the system of celestial bodies from the sun's point of view, to imagine spaces whose curvature is variable, the continuous deformations of space-time, and finally the articulation between number and form (*Gestalt*) under the various forms of analytic geometry, differential geometry, and algebraic geometry as far as Grothendieck topoi—all these decisions are founded on explicit metaphysical “leaps.” What negates an economics founded on numbers are the choices bearing values that correspond, in mathematical physics, to the introduction of new structures and appropriate observables, such as the quantity of movement, energy or entropy, fluidity, or the “color” of quanta.

### A Theology Overthrown

It is in biology that the myth of computable, alphanumeric data has produced the greatest distortions throughout the twentieth century, by making DNA a “program” separate from cellular materiality and by reducing organisms to simple “avatars” of genetic information. While biologists like François Jacob<sup>12</sup> directly identified genes with alphabetic writing, Francis Collins, director of the National Human Genome Institute publicly asserted in 2000, “*We have grasped the traces of our own instruction manual, previously known to God alone.*” This myth fabricates universals from particulars, by overthrowing the infinite-finite relation that had propelled the takeoff of science from Antiquity to the Renaissance. The finite technical activity of the computer programmer, the heir of the artisan-clockmaker, is projected onto the action of God or evolution. Moreover, a person reduced to a codifiable sequence of *bits* loses the material thickness that Renaissance painting had conferred on human figures when plunged into the tridimensional infinitude of the Universe. The relation between the finite human and the mathematical infinite is broken down by digital and alphabetic metaphors, which erect into mythological entities the images drawn from common sense—with which science is supposed to break. These images effect “transfers” of vague, “weak” meanings,<sup>13</sup> whose crude dualism effaces the singularity and historicity of the living, which is always *this living thing here*, with *this* body and *this* history, irreducible to the ideal invariance of mathematics, to the a-historic generic nature of its objects—or at least not in the same terms as in physics.

### **Strong Consequences of Weak Hypotheses**

The image of the DNA-program has had several consequences: first of all, the idea that biology, dependent on the properties of molecules, could be reducible to the laws of physics.<sup>14</sup> But which laws? Mathematical physics, from Galileo to quantum, has never ceased constructing and modifying its laws by confronting unprecedented phenomena. What I am trying to do in my work, along with Bailly and Montévil, is to articulate certain physical and mathematical theories with phenomena that are specific to life. In science, unification should always be provisional and “local,” not dogmatic and reductionist. But there are other consequences of the weak hypothesis when it is transferred from common sense to biology, whose effects on analyses of cancer interest me most at present. This domain was long dominated by the ideology of the computer program, in which cancer was supposedly the result of DNA deprogramming provoked by a signal that disrupted the instructions given to cells.<sup>15</sup>

### **From Triumph to Debacle**

Since 1971, enormously funded projects have heralded the final victory against cancer thanks to genetic therapies able to “reprogram” “deprogrammed DNA.”<sup>16</sup> These therapies were supposed to be based on the “rock” of chemical and physical laws, and the proximity of metaphors of “programming” to common sense facilitated their success among funding bodies and civil authorities as well as in public opinion. However, a half-century of genetic research has produced no genetic cancer therapy whatsoever, or even any solid knowledge about the unleashing and developing of cancer.<sup>17</sup> On the contrary, the huge effort to decode the DNA of cancerous cells (undertaken starting in 2000) has demonstrated that the complex nature of cancer cannot be reduced to any purely molecular cause. The enormous financial efforts and the harsh repression of alternative hypotheses have both been motivated for long decades by the idea that any phenotype presupposes complete determination by the genes. By contrast, approaches such as that proposed by cancer biologists Sonnenschein and Soto,<sup>18</sup> and adopted by Longo et al.<sup>19</sup> are based on the Darwinian principle that organisms, including cells, tend to reproduce themselves with variations (a limit-state analogous to Galilean inertia, but specific to life forms). Lacking effective control by tissues, hormones, etc., the reproducing cells may reach the speed of embryogenesis, which is the case with certain tumors. Thus cancer does not depend on a “triggering signal” at the molecular level, but on the failure of the regulatory relation between tissue, organism, and ecosystem. These

hypotheses, and their therapeutic consequences—which redirect the attention of researchers to prevention and environmental conditions—have only just begun to spread into the field, after decades of the informational-programming catastrophe.

### **Working Hypotheses in Biology**

And so it is appropriate to go back to Darwin, whose greatness is to have formulated the theoretical principles of intelligibility of the biological, on the model of the great creators in mathematical physics. The two Darwinian principles are descent with modifications and selection. The challenge is to articulate these principles with the analysis of the organism, unifying ontogenesis and phylogenesis. We have already looked at the role of principles in mathematics and physics, from the geometric structures of the space to the principles of conservation. The quest for principles in biology should follow these examples, but the principles specific to physics—founded on invariance, conservation of properties such as symmetry, and optimal trajectories—are inadequate for the reality of living beings. Living systems are in a constant state of critical transition: their symmetries are continually breaking up and being reconstituted.<sup>20</sup> Thus the Darwinian principle of reproduction-with-variation may be seen as a principle of *non-conservation*, opposed to and asymmetric with the principles of conservation and invariance in mathematics and physics. The adequate theorization of the biological field therefore demands extensions and intersecting of various physical theories—demands that we think of the coexistence of random classical and quantum phenomena in the cell.<sup>21</sup> These operations rely on existing physical theories, while remaining irreducible to their techniques; they are “points of view,” “perspectives” on the organism, whose unitary and primordial reality furnishes the guiding thread through these different theorizations. The intelligibility of the biological field is only possible through intersections and partial integrations that aim to construct objects-of-knowledge in dialectical relation with the constraints of “raw” experience. In biology, this experience plays a singular role, unknown to physical theories: thanks to mathematization, the latter cut generic objects out of the real, and their objectivity depends entirely on the theoretical framework. In biology, on the other hand, objects are always historic singularities, which are grasped by conceptual models that are qualitative, provisional, and over-determined by culture and ideologies.<sup>22</sup> The centrality of each singular organism, with its own historicity, implies the primacy of variation and the breaking of symmetries that overthrow the mathematical primacy of invariance—a primacy with very powerful knowledge effects, but which proves an obstacle to understanding life, especially when it is disfigured in the

image of DNA as the informational invariant and the myth of the “program.” For example, the materiality of each organism, its historical thickness, and the density of its internal and external relations, rule out any dualism between “software” and “hardware” that is specific to the notion of computer programs. Finally, one of the decisive operators of objectivity in physics is overthrown in biology: the space of phases (the observables and the parameters). Whereas space was fixed a priori as the condition of possibility and immanent norm of physical trajectories, in biological processes, by contrast, the singular trajectories constitute and constantly reorganize the space of possibles (of phases), the ecosystem, and the observables are the *results* of processes.

If our analysis of living dynamics is pertinent, it poses the problem of how to test the limits of traditional scientific objectivities, of which physics and mathematics represent the paradigms, in the face of the constraints of biological theorization. Overcoming very powerful theoretical practices that are rooted in venerable metaphysical and theological ideas is a radical challenge, but attempts are finally seeing the light of day.

Edited and translated from the Italian by Andrea Cavazzini. Translation from the French by Susan Emanuel. The complete original version “Le conseguenze della filosofia” can be downloaded at here (<http://www.di.ens.fr/users/longo/download.html>) .

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## Footnotes

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## Ideas of Savage Reason: Glass Bead in Conversation with Martin Holbraad and Eduardo Viveiros de Castro

Martin Holbraad,

Eduardo Viveiros de Castro

In recent years, under the heading of the *ontological turn*, anthropology has mobilized the metaphysical category of ontology in what appears to be, firstly, an attempt to sublimate the *crisis of representation* that problematized ethnography as an ultimately impossible task and, secondly, a refusal to reduce anthropology to the ontologization of human knowledge in the psycho-cognitivist style. The origin of this ‘turn’ is generally located in the work of French anthropologist Philippe Descola, who notably advocates for a structural inversion between the Naturalist (modern) ontology and the Animist (non-modern) cosmography, where one can be read through the lens of the other in the very project of anthropology: here, Naturalism supposes the continuity of physicalities (postulating a “Mononature”) and produces discontinuities at the level of Culture (postulating a “Multiculture”), while Animism supposes the continuity of Culture or “soul” (“Monoculture”) and sees discontinuities in Nature (“Multinature”). As Roy Wagner puts it, European praxis “makes souls” against the backdrop of a given material continuum; indigenous praxis “make bodies” against the backdrop of a given sociocultural continuum. In this model, we don’t have mind (or culture, or language) on one side, and being (or reality, or the world) on the other, but rather various ways of

being, or various ways of treating nature. Anthropologists Martin Holbraad and Eduardo Viveiros de Castro discussed with us the implications of such a ‘turn’ in the articulation of universality and diversity.



Araweté shaman bringing down the dead and the gods to partake of a tortoise banquet, Ipixuna, Pará, Brasil (photo by Eduardo Viveiros de Castro, 1982).

**Glass Bead:** Anthropology doesn’t accept anything as being generally true of all cultures unless the imaginaries, cosmologies and collectives it studies are equally seen as *variants* of each other: nothing could seem further from classical metaphysics. Still, for you the notion of being appears as the most powerful of the comparative operators under investigation: in your words, the aim of anthropology is to produce “equivocations” between ontologies, and its practice is cast as a “comparative ontography.” Not the comparison of ontologies, but comparison as ontology, in what appears to be less an ontology of comparison than a series of variations applied to the very domain of ontology. Can you describe the ways in which ontology—or rather, the ontological—ought to integrate the discourse of anthropology?

**Martin Holbraad:** I’m not sure these ideas necessarily all go together, or whether, at any rate, I can speak to them all. Given the nature of the anthropological debate on ‘ontology’ (a total buzzword by now, with all the problems that go with that), I think your point

about comparison as ontology, as opposed to comparison of ontologies, is a good place to start. Indeed: the idea that if anthropologists are interested in ontology it must be because they want to chart and compare different ‘ontologies’ has proved incredibly hard to budge for those of us who propose the concern with ontology, not as a new way of configuring the object of anthropological inquiry, but rather as a different way of imagining the nature of that inquiry—its coordinates, its modus operandi, and ultimately its ‘point.’ The misreading is hardly surprising. In anthropology (and I guess the same may go for other fields) this is what ‘theory’ has tended to look like: a tussle about how to think of our object of study: is it culture, social structure, habitus, ideology, experience, praxis, values, cosmologies, collectives, deep structures, cognitive schemes? So when anthropologists bandy around ‘ontology,’ it is assumed that this must be put forward as a proposal for a new object of study. Indeed, some of the people who are associated with the so-called ontological turn in anthropology do just that, e.g., Philippe Descola’s project of identifying ethnologically “basic assumptions as to what the world contains and how the elements of this furniture are connected”<sup>1</sup> and articulating comparatively four possible sets of them, or Michael Scott’s search for “root assumptions ... concerning the essential nature of things and their relationships,”<sup>2</sup> which, confirming the terms of your question, he calls “comparative ontology.” The lesson I took from Eduardo’s landmark essay “The Relative Native,”<sup>3</sup> which in my view is the most explicit statement of an altogether different concern with ontology—which I share—is that ‘ontology’ for us anthropologists designates not an object of inquiry, but rather the kind of ‘problem’ such objects pose to us. In fact, the thought goes, the very reason for which we should give up on deciding between ‘culture,’ ‘structure,’ ‘praxis,’ or what-have-you, as the rightful object of anthropological inquiry, is that the most basic problem any given object of inquiry poses to the anthropologist is that of deciding *what it might be* in the first place. So if ontology integrates the discourse of anthropology, as you put it, it does so by rendering anthropological ‘questions’ as ontological ones. I’ll try to show some of the implications of this, hopefully with some examples too, as the discussion develops.

Eduardo Viveiros de Castro: Coming “deuterologically” after Martin, I have the privilege of not having much better to say. So let me try to say more or less the same as Martin did with a difference. Let me start with the *comparison of ontologies vs. comparison as ontology* contrast. Some of my writing on the polemical theme of ‘ontology’ may occasionally have given room for aligning my position with the *comparison of ontologies* pole. For example, the stark contrast—deliberately provocative and therefore outrageously simplistic—*multiculturalism vs. multinaturalism* could be read as positing a

great divide between two major ontological orientations, namely, Modern Western and Amerindian, conceived as two opposed sets of fundamental presuppositions about the nature of 'reality' and the place (epistemological as well as ontological) of humans in 'it.' In fact, though, the contrast was meant to distinguish two opposed 'anthropological' outlooks, two anthropological ontologies, by which I mean at the same time, two ways of *doing anthropology*: (i) Western ortho-anthropology as the description of the sundry different human-cultural-spiritual ways of representing ONE reality-nature, versus another anthropology, the Amerindian hetero-anthropology as the nonrepresentational positing of a multiplicity of corporally-specific perspectives which 'constitute' reality (in the sense of being the stuff the world is made of); (ii) anthropology ("our" anthropology, the academic discipline engaged in the business of describing diverse human representations of both human and nonhuman Nature) as engaged in the comparison of *itself*—Western metaphysically-derived conceptual repertoire—with alien anthropologies that may turn out to have an entirely different set of conceptual presuppositions, including, crucially, different notions of *anthropos* and *logos*. This gives anthropology an 'ontological' quality or 'twist' ('turn'), insofar as its task is now to compare conceptual 'languages' without presupposing a concept-independent, 'exterior' ontological realm of *realia* that could serve as a baseline for the comparison. Anthropology becomes a game with no superior arbiter or impartial umpire, a game whose rules change as the game goes on. "Comparison as ontology," to my mind, means two things (again): (i) comparison collapses the epistemic and the ontological (word and world), as it sets as its task that of establishing the conditions under which alien concepts can be "translated" into our own conceptual language without having to leave the world they necessarily carry with them at the door; (ii) 'ontologies' only become understandable as continuous and contingent 'variations' (i.e., 'comparisons') of one another, both within and across those objects we used to call cultures, societies, cosmologies or intellectual traditions. Anthropology, through comparison, becomes a method, or perhaps a process, to discover difference and variation and to transform difference and variation into *what there is*: 'being' is *being able to be other, being virtually other*. Anthropology is not in the business of adjudicating on the correctness, consistency or even the proper grammatical 'number' of the noun 'ontology' (ontological monism vs. ontological pluralism, ontological monarchy vs. ontological democracy, etc.). In that sense, it is ontologically agnostic, or better yet, anarchist. 'Ontology,' as far as anthropology as an ontologically comparative endeavor is concerned, starts from, and with, the methodological principle according to which *we do*

*not know what being is* without having first engaged in ethnographic (ontographic) fieldwork. ‘Ontology’ thus becomes an ‘outdoor science’ like field ecology or natural history.

GB: The ontological turn of anthropology seems to share some ground with various forms of contemporary thought characterized by the attempt to undo or overcome the transcendental turn of modern metaphysics and to resuscitate the precritical notion of reality in which humans are not subjects but one of many “actants.” If Kant took the category of thought to be universal, the critical project of structuralist and poststructuralist thought can be said to have sought to relativize and historicize this position, by maintaining that there are multiple and irreducible ways to apprehend the world, relative to cultures, subject positions, or “worldviews.” Where Kant built his theory in terms of the features intrinsic to any cognition, structuralism and poststructuralism often externalized this view, casting it in terms of discursive regimes, ideology, or linguistic practices. Despite its alleged departure from Kant, some forms of structuralist and poststructuralist thought in anthropology seem to have nonetheless reproduced the logic of its position, claiming that the real is accessible only as mediated or constituted by discourse, epistemic constructions, etc. How do you cast your projects with regard to the complex debt of anthropology towards Kant?

MH: Following Durkheim, the trend in anthropology is to think of ‘categories’ as objects of empirical investigation: the ‘x’ take time to be linear, while the ‘y’ take time to be circular, and our job as anthropologists is to collect data on the x and the y in order cogently to describe their respective ‘temporalities’ (understood ipso facto, as you say, as relative and historical). One could note that the term ‘category’ here tends to be used loosely, to include much more than Aristotle or Kant ever had in mind, including such things as concepts, assumptions, generalizations, schemes of classification, patterns of reasoning or even behavior—pretty much anything... Still, the point is that this idea that something even remotely equivalent to Kantian “categories of the understanding” could be rendered as objects of empirical description raises a majorly ‘critical,’ if you like, query: if these empirically describable categories are meant to vary from one place or time to another, then what kind of categories would WE need in order to describe them in any given case? There appear to be two options. Either we have (or could develop) a repertoire of “categories of the anthropological understanding,” let’s call them, which could encompass all possible empirical variation of indigenous ‘categories’; or, alternatively, we would have to accept that, in some instances at least, the variation we wish to describe might be inconsistent with the categories we can use to describe it, in

which case our attempt to describe our varying ethnographic object would have to involve developing new anthropological categories for understanding it in any given case. The former option is interesting—it has something deliciously Aristotelian about it: the terms of anthropological description attain the status of ‘categories’ inasmuch as they become irreducible—i.e., the lowest common denominator of all the putatively varying indigenous ones. But note that this renders ethnographic variation superficial and derivative. The latter option, on its part, has something Kantian about it, since it adds to the task of ethnographic description a component reminiscent of *transcendental deduction*: what categories (though now I’d just call them concepts) do I as an anthropologist need in order sensibly (e.g., free from logical inconsistency) to describe my ethnographic material? E.g., what concept of time do I need in order to describe the putatively *circular time* of the x? What kind of thing must time be for me to be able to say, for instance, that the x take past events to return to the present, when, I take it, the whole point about past events (what makes them ‘past’) is that they’re gone forever? To the extent that there can be as many of these kinds of Kantian-sounding questions as there are ethnographic variations of such a concept as time, say, what we have here is a rather strange, but to me exciting, Kantian ‘relativism,’ with categories of the anthropological understanding multiplying in different directions through their exposure to ethnographic variation. And note, of course, that the manner of transcendental questioning that is required to set this multiplication in motion is ontological in the sense I indicated earlier: what must I take time *to be* (or *not to be*, for that matter) for my description of the ethnography of the x to make sense, is the question.

EVC: If we are (if we were) to stick to the Kantian project, I would observe that anthropology has always concentrated itself on Kant’s transcendental aesthetics and transcendental analytics (forms of sensibility plus categories of the understanding), even as the *anthropological turn* moved, starting with the French Sociological School, towards the empiricization and historicization of the transcendental (social time and social space, *mana* as the ancestor of the category of causality, Foucauldian epistemes as modes of the *historical a priori*, etc.). So, just to carry on with the Kantian vocabulary, I would suggest it is about time anthropology starts to confront head-on the empirical (ethnographic) deconstruction of the transcendental dialectics. We should be studying the *ideas of savage reason*, not just the “categories of the savage understanding (mind).” This would imply, of course, rejecting the purpose of transcendental dialectics, namely, the famous critical ban on “going beyond sense-experience.” In other words, we must, in a sense,

revert to a precritical ‘critical’ attitude towards the Kantian project, in order to reestablish “the transcendent” as a legitimate domain of speculation. After all, what are “institutions” like shamanism or divination, if not *sui generis* modes of speculative thought (shamanism as speculative oneirism, divination as speculative logics) that delve into what Kant dubbed the transcendent realm? One way to go beyond the Nature/Culture dualism that has been plaguing us since the dawn of Modernity is to thoroughly reconceptualize the notion of *Supernature* along non-Western, non-scholastic, non-Christian lines. Latour’s “mode of existence” that he calls Metamorphosis (see his *An Inquiry into Modes of Existence*) may offer an interesting starting point, the more so as—this is explicitly acknowledged by Latour himself—such “mode” is ontologically devalued or underdeveloped by the “Moderns” (it is reduced to the interiority of the subject’s unconscious), on the one hand, and is totally heterogeneous to the mode he calls Religion, on the other hand.

GB: If indeed the role of anthropology is not the study of representations anymore, but rather the study of ontologies, what is the role of the natural sciences (historically determined, as a matter of fact, by a Naturalist ontology) in your project?

MH: Much as I respect natural science in its own terms (and for all sorts of other reasons, albeit not uncritically), for me the most urgent task for anthropology in the twenty-first century is to stop thinking of itself by analogy to it. Very roughly speaking, I take the whole image of anthropologists as charters of the *sociocultural world around us*, in all its ‘complexity’ and ‘variation’ and so on, to be exhausted after an excellent innings, as the Brits say, of a century. There are myriad other ways to think of what we do as anthropologists, and exploring them in no way entails (necessarily at least) parting company with such cherished things as truth, method, discovery, rigor, argument, analysis, consistency, cogency, or whatever it is we think marks us out as serious people doing work that’s worth doing. Take for example the image of anthropology we’ve been discussing. Before I compared it with Kant because you invited us to do that, but I could just as well compare it with the rigors of, say, Grotowskian theater-making. Imagine that, roughly, as the task of training actors’ bodies to be so versatile as to be able to take on any theatrical character a play might throw at them: every bodily habit that gets in the way of taking on, say, Agamemnon must be painstakingly worked on in order to allow the space for that character to be embodied and, thus, expressed. It is just that order of rigor, and the kind of truth that emerges from it, that anthropology too can aspire to: let’s train our thinking—or whatever it is we *use* as anthropologists—to be so versatile as to be able to ‘take on’ (i.e., express, convey) any ethnographic materials life throws at us. And that, I

suggest, involves above all working on our habits of thinking about what the things we encounter in our ethnographies might ‘be’—ontological habits that tend to get in the way.

EVC: Here I will just take the liberty to quote (not verbatim) something that I heard from Patrice Maniglier, one of the few contemporary philosophers who takes anthropology very seriously. Maniglier suggests that what physics has represented to all the other natural sciences and, more importantly, to philosophy as well (from metaphysics to political philosophy to ethics) since the Scientific Revolution of the seventeenth century—namely, the role of a Model, a sort of epistemic Ego-ideal—is bound to be played by anthropology in the present century. With its central intuition that “being is being a variant” (Maniglier is a Deleuzian structuralist, like yours truly), anthropology sets a conceptual agenda that may—just may, of course—become crucial for the Anthropocene epoch.



Training at Jerzy Grotowski's "Laboratorium" in Wroslaw, Poland (1972, all rights reserved).

GB: This issue of the journal mobilizes Castalia, a fictional province dedicated to the synthesis of knowledge in Hermann Hesse's *The Glass Bead Game*, as a hyperbolic image of the ways in which humanism figured the project of reason of Western modernity. We'd like you to elaborate on the situation of what you call "comparative ontography" (and the distribution of agency therein) in relation to several threads of contemporary philosophy proposing to widen or reduce the *circle of the human*, namely antihumanism (according to which the human subject, classically understood, is not necessarily to be conceived as the privileged bearer of rationality), transhumanism (according to which humans are not the only rational agents), and post-humanism (according to which rationality extends itself beyond the human's biological and symbolic terms). Could you situate your projects with regard to those schematic (albeit predominant) polarities of contemporary thought?

MH: It's a good question because I think a lot of people tend to see a basic continuity between the kind of approach we have been discussing here and the broad trend in social theory at large (including many anthropologists, STS scholars as well as philosophers) to play around with, or even erase, the distinction between humans and nonhumans, to use Bruno Latour's language. For me, the alliance is a fragile one. To the extent that recent revisions of the human/nonhuman distinction express a broader willingness to deny or otherwise experiment with ontological axioms in general, their resonance with the kind of anthropological program we have been discussing here is certainly there. But again, there's also a basic distinction to be made. In my reading, a lot of the works associated with the various terms you mention—'posthumanism' perhaps captures the trend as a whole—are revisionary: their aim is to replace the ontological framework of humanism with something else, presumably something better. The ecological politics and ethics that often drives this agenda bears this out—the idea being that the 'modern' anthropocentrism of humans vs. nonhumans constitutes the ontological premise of our current ecological malaises, and must therefore be urgently replaced by a less self-centered metaphysics that will create the ontological conditions for a better future. For me—and here I may be in disagreement with Eduardo—these questions of political, ethical or indeed ecological virtue are external to the categorical imperative of anthropology (I'm joking with Kant), which, as we have said already, is that of keeping constitutively open the horizon of what is conceptually possible. That is simply the decision of *refusing to decide*, much less legislate, as to which ontological regime is better or truer, e.g., is it humanism or anti/trans/post-humanism? Our job as anthropologists, according to this image, is to find ways not to decide on these things, in order the better

to be able to allow the materials we study—our ethnographic exposures –to decide, as it were, for themselves. As human beings (or anti/trans/post-human beings for that matter) we may perhaps decide what we want. But as anthropologists we can't. We are meant to be conduits, not legislators, and our job is to help to express things, not to recommend them.

EVC: Well, not wishing to start a long (uncontrolled) equivocal dialogue with Martin here, I'll say that no effort to problematize the concepts of *anthropos* and *logos* (and the institutional apparatuses related to them) is foreign to anthropology as I (we?) understand it. I am in deep sympathy with currents of thought that seek to finish with the *state of ontological exception* (self-)granted to "Man" in the Modern era, the catastrophic political and ecological consequences of which is unnecessary to dwell upon. When the chips are down, it is not so easy to separate one's role as an anthropologist from one's predicament as an Earth being, a Terran. I would not wish anthropology to become a new transcendental arbiter that sets *no legislation* as the new rule of law. I am of the opinion that those new trends—not *all* of them, by any means—are actually allies of the anthropological position I (we?) defend. *Political* allies, I mean, i.e., people with whom one can find points of tactical, if not strategical, agreement. But epistemology and politics are just two names for the same thing. An anti-equivocal synonymy, if you will.

GB: Together with Morten Axel Pedersen, you wrote a text titled *The Politics of Ontology: Anthropological Positions*,<sup>4</sup> in which you claim that "the politics of ontography resides not only in the ways in which it may help promote certain futures, but also in the way that it 'figures' the future in its very enactment." Can you explain the main ways in which the move away from representationalism and the mobilization of the register of "figuration" can have traction in the domain of politics?

MH: I guess my question for anthropology is how it can be 'political' without importing from beyond its own terms of inquiry criteria of good and bad politics, let alone ready-made definitions of what counts as being political in the first place. Can we in fact refuse to decide on anything beyond what our ethnographic engagements require, as I have suggested, without thereby being profoundly apolitical or even conservative? My own answer takes the form of something rather reminiscent of the Cartesian method of doubt. (We did Kant already, so why not invoke as approvingly that other supposed philosophical baddie?) If the *no a priori ontological decisions* imperative serves to denude the analytical terrain in order to allow space for ethnographically driven alterity to operate, then it works rather like Cartesian doubt: Don't take anything for granted. But

where Descartes ended up, of course, was in having to take for granted the very act of refusing to do so. Now, as we have seen, the anthropological ‘cogito’ too, if you like, has a structure of its own: it is ‘constituted’ by keeping open the possibility of difference. So the question then is what ‘politics,’ if any, such a manner of inquiry may itself instantiate. In other words, if we accept that anthropology is par excellence in the business of giving expression to difference, then whatever characterization we give *that* as a political act would count as having emerged directly from the terms of anthropological inquiry, rather than being imported from elsewhere. In the piece you mentioned in your question we pointed out that this way of thinking makes anthropology an inherently antiauthoritarian discipline. And we even used the word ‘revolutionary’ in that context, which I think annoyed some people who prefer to measure revolutionary credentials on the scale of activism and commitment to already established revolutionary causes. To be perfectly honest, having come of political age in Greece in the 1980s (Alexis Tsipras was in the year below me in school), this kind of revolutionary brow-beating holds no excitement for me. Certainly, as far as anthropology goes, I am much more interested in a different sense of political action, which is expressed most forcefully by Adorno in his account of the musical significance of Schoenberg’s serialism. At issue there was the instantiation of radical difference—and in Schoenberg’s case certainly wholesale musical revolution—in the form of one’s own labor. And that, in my own case, I guess would be anthropology: the form of *its* labor, which we have been discussing throughout this interview.

EVC: Well, no quarreling with that. I just do not want to make anthropologists sound like those scientists who say that ‘science’ (and technology, the ultimately important practical consequence of science) is politically neuter, everything ‘political’ hinging on the uses others (non-scientists) make of it. The non-decouplable political aspect of anthropology lies not in its vouching for this or that ontological outlook, but in keeping all (ontological) options open as a matter of principle. If it belongs to the essence of anthropological ‘objects’ (very broadly speaking) the capability of being otherwise (*sensu Povinelli*), this means change—political, theological, economic change and what have you—is always on the table. But of course, just as “you don’t need a weatherman to know which way the wind is blowing,” as Bob Dylan famously sang, then we sure do not need anthropologists to tell us that European-born capitalist civilization is in its death throes, and is taking the planet with it to a very bad place, as far as many species (including our

own) are concerned. Anthropologists just help us focus our gaze elsewhere (‘otherwise’) and show what is out there—show that there are *a number of other possible worlds* out there.

Interview conducted for Glass Bead by Vincent Normand.

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## Footnotes

1. Philippe Descola. “Modes of Being and Forms of Predication.” *HAU: Journal of Ethnographic Theory* 4(1) 2014: 271-280. Print.
2. Michael W. Scott. *The Severed Snake: Matrilineages, Making Place, and a Melanesian Christianity in Southeast Solomon Islands*. Durham, NC: Carolina Academic Press, 2007. Print.
3. Eduardo Viveiros de Castro. “The Relative Native.” *HAU: Journal of Ethnographic Theory* 3(3) 2013: 473-502. Print.
4. Martin Holbraad, Morten Axel Pedersen, and Eduardo Viveiros de Castro. “The Politics of Ontology: Anthropological Positions.” *Fieldsights—Theorizing the Contemporary, Cultural Anthropology Online* 13 January 2014. Web.

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## The Photographic Real

Tristan Garcia

### The Ontology of Photography

Starting in the 1850s, photography became the principal purveyor of the real in our representations. Personal memories as well as the visual arts, cosmology, microscopy, medicine, administrative identity, eroticism and pornography, war reporting, historical reconstruction, legal testimony, and advertising, all developed by relying on a naturalist attitude<sup>1</sup> of ontological trust in the photographic product, ceaselessly furnishing the given real (*donné réel*) to various disciplines that manipulated representations. We might advance the idea that the visual modernity inherited from the nineteenth century relates in large part to the formula that the real is what is photographed, and representation is what one does with it.

For this reason, the *ontology of photography* played a prime role from the start: it was indeed necessary to give an account of the real being of what entered into a photograph, and to conceptualize and name what in a photographic image is communicated of reality. We wanted to be assured that when we are dealing with the photographic, we are actually dealing with something real that is captured by an image, which we then have time to work over and treat, for either aesthetic, scientific, informative, or political purposes.

As distrustful as we may be today about the construction of images, the fact that photography has served as the universal material of our visual representations may only be explained if we understand that we have never stopped acknowledging in photography something that escapes our constructions, something that was *given* to us.

However, after more than a century and a half of the ontology of photography, we have to admit the desperate situation into which the very concept of photography has fallen. The current situation has pushed into a corner all those who still think that photography is at an impasse—or rather, it has sent them back to a terrible dilemma. The first option is to recognize that the ontological trust granted to the photographic was an illusion from the start, and that there was never any real given in photography. The second option obliges us to name this given real, which unfortunately reveals our incapacity to make this kernel of reality resistant to destructive doubt. Everything that seems designated as pure reality in a photograph increasingly appeared in the course of the technological mutations of the photographic medium, as the complex product of an optical device and our gaze (it is our gaze that attributes to photographs a coefficient of reality that they do not possess in and of themselves). We feel caught in a trap. To understand the origin of this dilemma, we have to go back to the history of the ontology of photography, as we go back up a river, in the hope of finding a single concept of the real that suits all kinds of photography (film or digital) and resists the trend by which any history of photographic thought seems to suffer an interminable military retreat. Overly ambitious positions of realism are gradually abandoned in favor of more modest positions; the realist citadel is on the verge of collapsing—and if it is evacuated, then the photographic will have to be thought of as a particular genre of pictoriality, understood as the simple inscription of lines, and eventually of colors, onto surfaces. But considering the photographic as a genre of pictorial and not as a separate species, is to make photography into a mere technique distinct from stained glass, as stained glass is from engraving, or from oil painting, or from the blown projection of pigments in parietal art. It means admitting that there is no essential difference between inscription by the human hand of ink or ochre or charcoal onto a surface, and the inscription of variations in luminous intensity onto a sensitive surface by the intermediary of a photographic device. But the ontology of photography was born precisely from this feeling—so difficult to explain—of an essential distinction between the pictorial and the photographic, which pertains basically to an inversion of causality between the object and subject of representation.

This is the idea we no longer manage to believe in today. Let us begin our journey back up the river of photographic thought with the simple intuition that at first (in the nineteenth century), the pictorial was conceived as the inscription of lines on a surface, whose cause did not relate to the object represented but to the subject performing the representation. By contrast, in the photographic device, we admit from the start that the

cause (one of the causes, in any case) of the representation is the represented object. Nobody to our knowledge has thought that the object represented in a photograph was the *absolute* cause of the representation, but only that the subject (here the photographer) was no longer the exclusive cause of the representation. To put it simply: in any kind of depiction, the object aimed at is perhaps the purpose of the painting or drawing, but it is certainly not the material cause of the representation. The face of Thomas More, as Hans Holbein paints him, is in no way the material cause of the painting in which he figures. On the other hand, the face of Baudelaire, in the famous portrait that Nadar took of him, enters into a series of causal chains (which obviously must be clarified) that lead to the portrait. The very head of the poet, the form of his skull, the fineness of his hair, act in some fashion on the light, which in turn acts on a sensitive plate, which finally acts on the image obtained.

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By photography's "given real," we now mean the determination of this causal continuity between what is photographed and the photograph of it. It is this given real that has always been the Holy Grail of the ontology of photography. Thanks to the definition of this given real, it has always claimed to justify the modern trust we placed in the photographic, which is on a par today with the distrust that threatens to conquer our minds.

To avoid reducing photography to a sort of luminous drawing (the reality of which the moderns strangely believed in) we must go back through the history of the ontology of photography in search of a definition of the photographic real that stands up, that resists the movement by which the ontology of photography seems ineluctably to be beating a retreat.



Liz Deschenes, "Gallery 7". Walker Art Center, Minneapolis, 2014. Installation view. Courtesy the artist, Miguel Abreu Gallery, New York, and Walker Art Center, Minneapolis. Photo by Gene Pittman

### **Ontological Retreat I: Nature**

The first moment in the history of the ontology of photography could be called “naturalist.” By “naturalism” we mean (especially in scholarly circles and among those who first thought about photography) the shared belief that what is essentially given in the photographic image is Nature. In the first texts that tried to define what distinguishes the apparatuses of Daguerre and Niepce from paintings, the frequent recourse to the term *achéiropoiétos image* (“that which is not from the hand of man”) and the recurrent metaphor of the natural writing of light, both indicate the very first ontological status of photography. We were no longer before an image that man took of Nature, but before an image that Nature took of man: photography would allow a

human to have objective knowledge of his face thanks to the art of portraiture; it would reveal a human being who was no longer the subject but the object of the image, which was able to offer a natural point of view of himself.

This is one formulation of this first ontology of photography.

And what in this photographic naturalism allows us to define the continuity of the real between what is photographed and the photograph itself? It is *exact* natural form of things. In a famous speech to the Chamber of Deputies, Francois Arago, the French scientist and politician (1786-1853), illustrated and defended the recent invention of Daguerre by quoting the painter Delaroche:

*M. Daguerre has discovered the particular screens by which the optical image leaves a perfect imprint—screens where everything that the image contains is found reproduced in the minutest detail, with incredible exactitude and fineness. In truth, it is no exaggeration to say that the inventor has discovered the means of fixing images—if his method conserved colors .... In a word, in M. Daguerre's black chamber, light itself reproduces the forms and proportions of external objects with an almost mathematical precision.<sup>2</sup>*

Thus what is conserved by the photographic image of the real, by the intermediary of light, are the natural forms of external objects, imprinted directly on sensitive plates. The contours of the photograph of a tree resemble in every point of detail the real silhouette of this tree, seen at a certain distance from a certain viewing angle. It is so accurate that we may imagine why the theoretician of the image John Hyman would much later call a photograph an “occlusion shape”: “the occlusion shape of an object is what some philosophers called its ‘apparent form,’ in other words its contour under its silhouette ... for example, a circular dish seen obliquely would recover (or be covered by) an elliptical spot on a plane perpendicular to sight.”<sup>3</sup> These forms of recovery indicate the possibility of an exact correspondence, term by term, between the natural qualities of physical objects and the qualities of the photographic image, which theoretically has just recovered it.

This exactitude was indeed presupposed by the first amazed theories of photography. Even Baudelaire refers ironically to it, though he prefers the Beautiful (which is the object of Art) over the exact truth of photographic forms (which should be left to technique, “the very humble servant of the arts”).<sup>4</sup> However Baudelaire (as well as Elizabeth Eastlake<sup>5</sup> in the same period) was beginning to doubt the perfect correspondence between natural forms and photographic forms.

Naturalist faith in photography, which primarily relates to conceiving of it as a tool of knowledge, will in fact crumble quite quickly, attacked on at last three fronts.

First of all, the proposition that the natural forms of things are said to be communicated by light to the photographic image implies adopting a modern variant of Epicurean physics. Natural things had to be considered to be diffusing in all spatial directions the objective images of themselves—what the Epicureans called “*simulacra*”—which the eye or mirrors arrests and captures. To consider that photography was a means of “fixing natural images” was to judge that images preexist their being photographed, hence they are constantly diffused in the luminous milieu, and the photographic device merely authorizes catching them on the wing. In effect, the naturalist can scarcely claim that photography *immediately* seizes objects’ natural forms, which by definition are located *at a distance* from the lens. Hence the light must somehow transport the natural forms of things through space to communicate them to the photographic device. Outside any conception of the photographic, one must therefore defend a natural conception of the images produced by the things themselves, and not by perception of them. So it becomes indispensable to revive a physical conception despised by the history of optics: images of things are detached from the things themselves, like the tiny filigrees that hit the sensitive surface of the apparatus, which is then simply a new mode of fixing and tearing from the course of time these natural flows of images in ambient space. Of course, everything in modern physics runs against such a representation of light and of images. The second difficulty encountered by naturalism relates to the evolution of the photographic art: pictorialism (but also the first experimental manipulations, which would lead to the rayograms of the Surrealists and the Soviets), quickly indicates within photographic aesthetics a desire to make *the taking* triumph over the natural given of photography. The effects of blurring, the use of gums, the first montages, and the superimposition of images all tended to weaken the idea of a natural photographic real, communicated objectively and *en bloc* to the image, and instead favored the conception of power relations between something given and something seized or constructed in any photographic act.

The final objection is the most serious for a naturalist ontology of the photographic image: it relates to the failure of the conception of “forms of recovery.” In a photographic image there exist no natural forms of things that might by themselves recover the things seen. Nothing is cut out *in itself* in such an image. If one may identify in a photograph various entities distinct from one another, the difference between these entities is not inscribed in the photograph itself, but must be generated by the perception and

consciousness that is brought to the image. Any photograph is a homogeneous surface in which all parts have an equal ontological dignity, such that inside the image there exists no difference in kind.

### Ontological Retreat II: Presence

This inaugurated the second phase in the ontology of photography, no longer naturalist, but “presentist,” which served as paradigm for any modern thinking about photography in the twentieth century. The ontology of photography gradually turned away from the natural and exact form of things to embrace the much less determined term of “presence,” applied no longer to differentiated entities, but to the ensemble of what appears in a photograph. The photographic image no longer attests to the primary or even secondary qualities of objects (size, figure, color, texture, etc.), but to the simple fact that *this* existed, that it was there. What is real in any photograph? Not so much the objective qualities of a being than their existence, prolonged by the image beyond their disappearance.

The modern ontology of photography exchanged an overly ambitious classic realism, which made photography an analogous and perfected technique compared to the human eye, for a more modest realism (but perhaps more intense), which made photography a secular version of the miracle.

In the emblematic essays of Walter Benjamin, André Bazin, and Roland Barthes, we see the desire to believe in the power of photography, which is of course incapable of being the expression of the natural form of things, but yet capable of transmuting the religious hope of resurrection into aesthetic affectivity. This hope is still tinged with melancholy, since the general presence conserved in the image does not prevent the death of any living being that was saved by photography. What is living remains in some fashion present in the image, but it does not remain living. On the contrary, its death is endorsed or anticipated by photography, which is compared by Andre Bazin to embalming.

Of course, Bazin never stopped being a naturalist, and he believed in the objective character of photography, but his ontology indicates a clear inflexion toward a presentist conception. What distinguishes the photographic image above all from the pictorial image is the power it possesses to *make us believe*: “Whatever the objections of our critical mind, we are obliged to believe in the existence of the object represented, effectively re-presented, that is to say, made present in time and space.”<sup>6</sup> Fetish figure of the presentist thesis, Saint Suaire of Turin, who “realized the synthesis of religion and photography,”<sup>7</sup> showed that photography arises essentially from *attestation*: it attests to

what was really present. As a mechanical witness, it accomplishes a transfer of presence, tearing from the destructive power of time the presence of what no longer is, embalming it and conserving it in the image.

The final pages of Roland Barthes's *Camera Lucida* represent the best example, the culmination (and at the same time the swan song) of photographic presentism. It incarnates a powerful modern faith in the capacity of the photographic device to accomplish the promises of Christianity, the Eucharist, and the resurrection of the body. Something of Barthes's mother, who had just died, appears almost resuscitated in her photographic image. "The photo of the dead person comes to touch me like the deferred rays of a star," writes Barthes,<sup>8</sup> "and finally the Winter Garden Photograph, as pale as it may be, for me is the treasure of rays that emanated that day from my mother-child, from her hair, her skin, her dress, her gaze."

What has been photographed has caused "to emanate" from itself the luminous rays that are preciously conserved by photography. The presence of Barthes's mother as a child has passed into radiance, which has passed onto the sensitive surface, which has constituted the image. And the image reproduces these rays, as if the loved were still present in the image, as if it were a dead star whose rays touch the eye long after it has died. But unless we understand "emanation" as the magical transmission of presence, the luminous rays that were conveyed by Barthes' mother did not carry along with them the material presence of the young girl—quite the contrary. At the most, we might think that she was present in the luminous rays, just as the cause is present in the effect. But now what do we understand by "presence" (on which Barthes insists in order to affirm that it is not "metaphorical")?

### Ontological Retreat III: The Index

The long retreat of the ontology of photography has continued just as if such a conception of presence and its magic step-by-step communication were not a tenable position.

While presentism served as a *modern* ideology of the photographic, the indexical became the *contemporary* ideology. Indexicality is a reinterpretation of the semiotic categories of Charles Sanders Peirce, notably that of the *index* (by Rosalind Krauss,<sup>9</sup> then the diffusion of this model, from the theses of Philippe Dubois in *L'Acte photographique*<sup>10</sup> to those of Jean-Claude Lemagny); indexicality means envisaging the photographic image as an "index" of its real cause. For Peirce, the distinction among three types of signs (or *representamen*)—the icon, the index, and the symbol—rests on the difference between

possible relations between the sign and its object: the icon (for example, a drawing of a tree) is linked to its object by *resemblance*; the symbol is associated with it by *rules* or *laws* (hence by convention, as with the word “tree,” which in no way resembles a tree); the index is connected to its object by *causality*. Smoke is the effect of fire, which it indicates and betrays. The footprint in the sand is the effect of the foot, of which it reveals the form.

Rosalind Krauss, in order to characterize not photography but a particular current in American art of the 1970s, reutilized the category of the indexical, which enabled conceiving of photography as the effect of what was photographed. “Photography is an effect that reveals and betrays its cause,” writes Jean-Claude Lemagny.<sup>11</sup>

Presentism did not directly confront the previous naturalism, and the indexical position did not confront the precious presentism. Very discretely, even laying claim to its heritage, it performed a simple strategic retreat. To the extent it appeared untenable to maintain that what had really been there in front of the lens was still present in the image, the indexical position revisited the lowering ambitions of presentism, adding a mediation: What is real in photography is not what was, but the *imprint* of what was. Photography as an index would be this physical object that has lost contact with the reality that has left it because it is past, but has conserved *something* from its effective encounter with this luminous reality that has now disappeared: an imprint, in this case luminous.

We see clearly the difference between presentism and indexical theories. For the latter, nothing of the thing photographed is still present in the image, but the image is the real index of what was once there. What is real in a photograph is a certain *effect* of the real. Something real remains in all photographs, but it is significantly distanced, since one never has access in photography except to its effect. But at least the continuity between the real and the photographic image is not totally broken;<sup>12</sup> it barely persists, but it persists just the same.

#### **Ontological Retreat IV: Photonic Imprint**

Alas, it seems that the retreat of the ontology photography must be endless. Even the thesis of measured realism has suffered a significant reversal. In Henri van Lier’s *Philosophie de la photographie*, it finds itself attacked (correctly) as the last residue of magical thinking, which introduces a link and a continuity where none exist. Henri Van Lier reminds us that nothing of what was represented in the photograph was ever imprinted on the sensitive plate of the photographic device: the face of the beloved never

touched the lens, it was never imprinted (except metaphorically) on the film. Van Lier thus proposes a more exact (but also more reduced) version of indexicality, considering that this alone in a photograph is real: the photonic imprint. The sole real and material continuity between what was photographed and the photograph relates not to the scene, which remains at a distance, forever separated in its fleeting presence, but to the photons, vehicles of the light that, affected by the photographed scene, struck a sensitive surface, upon which it left a material imprint, conserved by the photographic negative.

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But no quarter will be given the defender of the real in photography, who finds it increasingly remote as he fences to defend and circumscribe it. In a recent article, André Günthert cites an astonished critique by the physicist Jean-Marc Lévy-Leblond of the ignorance among photographic thinkers about the physical process by which phototonic recording occurs:

*The transparency of a milieu or its opacity ... result from a very complex mechanism: the luminous incident photons are absorbed by the electrical charges of the milieu ... and set them in motion; these charges then reemit new photons, etc. Thus it is only the result of these iterated processes of absorption and reemission that enables establishing if and how the body lets the light pass, or else blocks it.*

In other words: “The photons that enter into a glass plate are not those that leave it ... There has indeed been a complete renewal of these constituents of light within the material.”<sup>13</sup>

However, Henri van Lier’s defense of a photonic imprint as the minimal formulation of a photographic realism cannot withstand a fresh attack: the photons that were in contact with the faces of our youth are not those that entered into contact with the photographic device, and those that entered the lens are not those that left it.

Thus, nothing that was in contact with the photographed materially enters into the photographic image. If we understand photographic reality as what we might define and call a *continuity* between the photographed and the photograph, then today we seem unable to designate any photographic reality at all.

And if the ontology of photography is no longer able to define such a specific reality, then photography is no longer thinkable except as a genre of pictorial images. Here we have ended up with our initial point: the trust of our natural attitude toward photographic reality is no longer correctly founded on any concept whatsoever. It is merely a habit. As soon as the habit is worn away by time (since it will have no well-founded discourse to

sustain our trust in the photographic) then it will completely disappear. Here we are cornered at the edge of the void upon which it now appears that our conception of photography has always rested.

### **At the Edge of the Void**

At the finale of this step-by-step retreat, the current ontology of photography finds itself like a routed troop at the edge of a cliff, after suffering a protracted withdrawal from the field of the real, along the way abandoning nature, presence, the thing's imprint, matter's imprint, and material continuity.

One possibility is that it jumps, totally renouncing (in the current conditions of production and conception of what is still called photography) an ontological difference between the pictorial and the photographic. It might lay down its weapons and admit that the ontological difference of the photographic was an illusion of modern aesthetics, and that photography consists—neither more nor less than all the other pictorial genres—of lines inscribed on surfaces by certain technical devices. Then it would stop saying how the photographic is distinctive, because it is no longer able to define what in photography comes from a causality that is imputable to the object represented rather to the device of representation.

But then we could have to stop believing in the photographic as the principal purveyor of the real in our representations. We would have to revise our irrational belief in photographic material. This would surely be a painful revision for human culture, and it would long bear the bitter taste of defeat—the defeat of modernity as a whole.

The other option is to refuse surrender. Such a position presupposes our remaining in opposition to everything, with our backs to the void toward which the history of the ontology of photography appears to be pushing us, we *realists*.

Let us try a last desperate movement. Let us wager that this realism is still possible. How could we find a way to hold a last impregnable position, except from a lucid awareness of the price to pay? To conserve realism, we have to sacrifice a notion with which it was associated until now. To keep the real in photography, we have to completely give up something to which the ontology of photography has blindly clung: the material presence of things. The very being of photography in fact invites us to separate realism and materialism. In order to remain a realist about photography, we are barely starting to understand that we must necessarily admit that what is given is not material, but that there does exist a real continuity between the photographed and photography—*which is not a material continuity*.

## The Real without Matter

The given real of photography is not the material presence of light but rather a state of matter, specifically of light, and hence of *information*. Charges are exchanged, energy is transmitted, and the result of this energy is passed from photon to photon. Photography is a technical device that precisely makes an abstraction of the singular presence, here and now, of each photon, and extracts from it information (a state of matter) at the encounter between a sensitive surface and a bundle of photonic particles.

Let us sacrifice a little more matter: this bundle of particles in question is not necessarily a bundle of *photons*. If we consider the progress of scanning electron microscopy, it is possible to identify a sort of scientific photography whose resolution descends to the wavelength of visible light, which is determined by photons. We may now take photographic images of minuscule portions of matter, at a scale smaller than the visibility threshold of material objects. In such an operation, the technical device somewhat mimics photography, by organizing the encounter not between a bundle of photons and a sensitive surface, but between a bundle of electrons—in interaction with the portion of matter of which one wants to take the image—and the measuring apparatus. Grasping details on the order of a tenth of a nanometer, scanning electron microscopy cannot be considered “photography” by anyone who would still define photography as a luminous medium. Here, the image appears indeed below the threshold of visibility, below what photons can reveal, but there is still a way of relating to images of the infinitely small just as to ordinary photographs: Simply consider that any photograph consists of the abstraction of a piece of information on the basis of the encounter between a bundle of particles (affected by a state of matter) and a sensitive surface sensible or a measuring surface. For a long time, these particles were exclusively thought of as photons, thus appearing to link inseparably the essence of photography with light. Even though photography remains (and no doubt will always remain) mostly conceived as photonic, scanning electron microscopy shows us that the most general and most correct definition of the photographic does not necessarily involve photons—vehicles of light—but rather all sorts of particles, which a directional flow (affected by the encountered matter) brings to be cut out and recorded on a plane.

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In any kind of photography, film or digital, retouched or not, there is in fact an infrangible kernel of the real, but this real is not material, but rather a relation (or a series of relations). It is a piece of information abstracted from matter *hic et nunc*. To judge the

photographic in this way means to assure ourselves that—in the current state of knowledge and of contemporary technical devices—we may have a trust in photography that does not risk being betrayed.

Such a realism-without-materialism—which considers that what passes from the real in a photograph arises only from a relation between certain material elements and not from the material elements themselves, or from their presence—has the first beneficial consequence of reunifying photography *a priori*. Instead of wondering about the ontological transformations effected by the shift from film to digital, we should consider that photography has *always* been digital *without knowing it*. It has always dealt with information, not with presence. Of course, the photographic devices of the nineteenth and twentieth centuries could make us believe that photographic images do conserve of the real something other than information; but we must acknowledge that photography introduced the digital, starting in the mid-nineteenth century, into our cultural representations. This is the first victory for our ontology: we no longer have to think of the digital as a destruction (at least partial) of the essence of photography, but on the contrary as the accentuation of its being. We are no longer condemned to read the history of photographic techniques as an interminable succession of reverses, of ontological catastrophes. What today we call digital images are merely the realization of the latent character of all photographic images, which withdraws from light the relations between its elements, which are capable of being transmitted and reproduced.

### Information

Here “information” signifies that which, of the material presence of several entities, may be abstracted, treated as a relation, and thus reproduced with other entities (in this case, other photons). From this standpoint, there is no difference between the ontology of sound recording and the recording of light. On the occasion of the recording of a Bob Dylan song in 1964, to maintain that the sound waves that traversed the studio space were captured and conserved in their very presence on the master tape means producing a magical image of the recording, in effect taking metaphors—such as the spectral nature of the recording of voices<sup>14</sup>—as concepts, and being fated in time to feel disappointed and tricked by the reality of the recording. Any mystique vanishes once you think about the recording process.

To be ontologically realist about a recording means not asking it to conserve the nature of things, any more than to conserve presence or matter: nothing of the presence of the hand of Bob Dylan striking the chords of his guitar one day in May 1964 passed

concretely into the recording of the song. The sound waves caused by this movement are not immortalized by this recording: instead, the movement of the air entrained the movement of the membrane of microphones, which entrained mechanically, step by step, the inscription not of the sound wave itself but of certain relations between the sound waves on the magnetic tape. This step-by-step effect of the movements of Bob Dylan's hand and his voice is effectively conserved as a physical object, but to be a realist means to consider that in this transmission, presence is never conserved. On the contrary, the material presence of the voice is abstracted in favor of the relations between the material elements of the effects of the voice. It is these relations that are inscribed, transcribed, recorded.

No recording is merely a technical resurrection. One must not understand a recording as an effect that reproduces its cause. The sound waves caused by the movement of the vinyl disk entraining the arm of the gramophone that plays Bob Dylan's record are not the same sound waves as those that traversed the recording studio in 1964. They are not the same in a precise sense: their material presence differs. It is a matter of other waves, but their relation conserves (at least in part) the relation they maintained with each other on that day back in 1964.

No recording conserves or reactivates the essential qualities of things, or their presence, or their materiality. Quite the contrary, the sole means of being a realist in the face of the challenge offered by recording techniques is to admit that recording always consists of making an abstraction (absenting the material presence) of the qualities specific to the things recorded, and conserving solely the relation (or certain relations) between these things in order to be able to reproduce these relations with other singular material entities, whose presence has nothing to do (except metaphorically) with that of the things recorded.

To think of the ontology of recording, you have to shed any fetishism, any magic belief in the conservation of the present and material presence of things—of the voice, of bodies, of faces. All that, like everything else, is always engulfed by the passage of time, and sees its presence diminish tendentially in intensity as it becomes the past. No living being, in being recorded, has ever been torn out of time. But the composite of several beings together might be replayed with other beings, as one performs the same play with other actors. It is solely by thinking about recording like this that one avoids fetishism—and ultimately the disappointment that always leads to a denial of the given real of a recording. Recording is not of matter, but of information.

Photography and sound recording somehow invented modern information as the conservation of the relation between entities, reproducible at will with other entities. And the modern real that is revealed by recording is in fact information.



Liz Deschenes, "Tilt / Swing". Miguel Abreu Gallery, New York, 2009. Installation view. Courtesy the artist and Miguel Abreu Gallery, New York. Photo by John Berens.

### **Recording: Transforming Events into an Object**

Thus the character of recording (of sound as well as of light) relates not to the conservation of acoustic or luminous matter, but arises from material information, which occurs by the transformation of an event into an object. To record is to arrest by a device one or several events—acoustic or luminous—in order to make an object. Let me clarify this point. What a photograph captures is an ensemble of luminous events—in this case the passing of bundles of particles, of photons. By extracting relations from these bundles, the photographic device arrests the event, which is no longer taking place. The events that are the encounters by these bundles of particles of a sensitive surface

henceforth appear as an object, a stable portion of space-time. If an event is what is represented in language by a verb, then an object is what corresponds to a noun.<sup>15</sup> Events are “to do” and objects are deeds that are done. Thus an object is identifiable and identifiable through time, whereas an object is what can remain identical. The photograph objectifies real events in the course of their happening, since it extracts luminous information from them. But the transformation of events into objects corresponds to a change in ontology, not to a material transfiguration: it is always possible to sort the world into events and objects. Photography, as a form of recording, is *a machine that obliges the gaze to treat an event as an object*. A photographic image, once it is taken, never totally ceases to be a possible event. We may continue to consider a photograph like an event, hence as an entity that changes with the passage of time. For example, this is the aesthetic effect produced by the works of Liz Deschenes,<sup>16</sup> which are images whose time of revelation is mixed up with the time of exposition: moment by moment, in front of the viewers, the image never ceases evolving. Any photograph, as an event, does not stop changing, even imperceptibly. As an event, the photograph of our younger face, taken years before now, does not date from a decade ago: now it dates from now. Today, it dates from today. It is a continuous doing, not a done deed. The photograph, as an event, is not unidentifiable, it is a process that never stops, and at the present instant it is of the present instant.

However, we see the photographs that we actually have in our hands as real testimony of a past event. We are in effect brought to consider them as objects, hence as identities that are durable, identifiable, and re-identifiable through the course of time. This is the rule of any recording: to record is to produce a device that enables cognition to pass from a world of events to a world of objects. The recorded object may still be considered as an event, but it then loses its capacity to really retain a past event. As soon as I see a photographic image as an actual event, it stops conserving something—real information—of the past. This is the price to pay. And the photograph, as a technical device, permits my cognitive apparatus to see a certain image among events no longer as an event, but as the objectification of several luminous events of the past.

### **To Represent: To Absent Something from the Present**

As a machine to really transfigure the information of past events into a trans-temporal object for my cognition, photography (as well as phonography) is not a materialist resurrection, but a recording that cannot prevent itself from representing. Evidently

Photography is not content with *recording* luminous information: it *represents*, on the occasion of this recording, scenes that engage the bodies, figures, and attitudes of both living beings and landscapes.

If we understand representation primarily as *absenting something present*, rather than as the *presentation of something absent*, then photography necessarily does represent. In effect it consists of absenting the singular presence of matter. Far from actually communicating the natural qualities of objects, either their presence or their matter, photography makes an abstraction of them. It absents presence and materiality from the real *hic et nunc*. Photography is the real luminous abstraction made from its matter. It suffices to conceive of a technical discipline as absenting a portion of presence in order to be able to represent. Thus pictorialism has always consisted of abstracting from space one of its dimensions, and treating a three-dimensional space as a quasi-surface. Any pictorial image (any painting, any drawing) represents first of all what is presented as a surface effect, which obliges our cognition to deal in two dimensions with what in fact has three, hence to abstract a surface from matter. But photographic recording is ontologically distinct from pictorial images in that it does not abstract a surface from matter, but instead information. The pictorial image withdraws from matter only one of its dimensions; the photographic image lifts out of matter its whole presence. It absents everything that was present. It withdraws the relations between elements and matter, which it conserves by reproducing them with the help of other elements. Everything that in matter is not luminous information is absented by photography.

And for this reason, any photograph represents something. By a rational rule of compensation, everything that absents what is there presents also something that is not there. This does not mean that any photograph represents something preexisting, something that existed before being photographed: photography may invent what it seizes. But it cannot fail to *represent* it, that is to say, to present to the eye something that is not materially found there.

There is always a sacrifice at the heart of being in order to be able to represent. This is because the present matter of this fine day no longer exists, because it has not really passed into the image, because the image has absented something of the present. *And this is why something of the absent will never cease being presented by the image*, as long as the image lasts. This explains why I may see in the photograph something other than a code, than abstract information, and why this abstract information makes present to me something—which is not there.

And this is exactly what photography has never ceased purveying since the nineteenth century: information that tears light from presence, that records it, that arrests events and transforms them into an object, which absents from the real its materiality, and which incidentally presents scenes peopled with bodies, faces, and landscapes that are not materially there. Whoever grants to what is photographic a trust based on this reasonable certitude does not risk being deceived or fooled by photographs and their scientific, artistic, journalistic, or even intimate usages. At the end of its long retreat, the ontology in search of a just definition of photographic reality may hold onto (at least for a while) this idea of photography. What truly is photography? It is what taught our perception to untangle reality and materiality in the light of things. It is what has furnished to our modern representations a sort of basic representation, a figure of the real as information of matter. Phonography has given this to us in the sound element, and photography in the luminous element, even if today these particles enable us to accede to an infra-luminous photography. Photography has furnished us with a new form of the image, which makes an abstraction not only of a dimension of space (as drawing already was doing), but of its whole materiality.

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However, if we still want to confuse the *affirmed* real with the matter *denied* by photography, then the whole house of cards of our modern representations will suddenly collapse, and will fall to the level of pre-modern pictorialism. Because of having demanded too much and the wrong things from photography, we will no longer grant photography anything distinct from what we have always recognized as our everyday points, lines, surfaces. This would be an aesthetic tragedy, and turning our backs on all the old modernity as if it had never been more than a gigantic error of judgment. From our entry into the modern era, we will have believed too strongly in photography, and at our exit from that era we will have believed in it too weakly. We will never have proved capable of a perceptive attitude that is just and equal to what photography communicates to us of reality.

Let us try to demand of any photograph nothing more nor less than what it can do: photography is neither a technical miracle of nature nor a simple constructed and manipulable symbol. Finally, let us endeavor to regard everything that has been photographed in this way: as a determined absence of matter that empties the real of everything that was found present there, in order to retain its information, to make it visible.

Translated from the French by Susan Emanuel.

An unabridged version of this text is available of the Research Platform (<http://www.glass-bead.org/research-platform/le-reel-photographique/>) (french only).

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## Footnotes

1. In the sense Edmund Husserl gives to this expression: an attitude consisting of making incessant judgments about the being of objects in themselves.
2. François Arago, et al. *Rapport sur le daguerréotype*. 1839. Preface by J. Bérezné. La Rochelle: Rumeurs des Âges, 1995. Print. Quoted by François Brunet in *La Naissance de l'idée de photographie*. Paris: PUF, 2000. 100. Print.
3. John Hyman. "Pictorial Art and Visual Experience." *British Journal of Aesthetics* 40 (1) 2000: 8. Print.
4. Charles Baudelaire. "On Photography" (from "The Salon of 1859"). Quoted in Jonathan Mayne, ed. *Charles Baudelaire, The Mirror of Art*. London: Phaidon Press Limited, 1955. Print.
5. "Far from offering a mirror up to nature—an expression as triumphant as it is erroneous—offers something that although beautiful, ingenious, and estimable for its power of reflection, nevertheless remains subject to distortions and deficiencies, for which there is no remedy," François Brunet wrote in his article devoted to Elizabeth Eastlake. "Et pourtant des choses mineures...." *Etudes photographiques* 14 2004. Print.
6. Andre Bazin. "The Ontology of the Photographic Image." *What is Cinema?* Trans. Hugh Gray. University of California Press, 1971. Print.
7. Ibid. Barthes also mentions this.
8. Roland Barthes. *Camera Lucida*. Paris: Gallimard, 1980. Print.
9. Rosalind Krauss. "Notes on the Index: Seventies Art in America." *October* Autumn 1977. Print.
10. Philippe Dubois. *L'Acte photographique*. Brussels: Labor, 1983. Print. In this book, Dubois says that what we have called the "retreat" of the ontology of photography has three stages: "photography as mirror of the real," "photography as transformation of the real," "photography as trace of a real." The index arises in the third phase.
11. Jean-Claude Lemagny. *L'Ombre et le temps. Essai sur la photographie comme art*. Paris: Nathan, 1992. Print.
12. This is what André Rouillé calls the "continuity of manner between things and images." *La Photographie. Entre document et art contemporain*. Paris: Gallimard, 2005. 615. Print.
13. André Günthert. "L'Empreinte digitale. Théorie et pratique de la photographie à l'ère digitale." *Actualités de la Recherche en histoire visuelle* October 2007. Web.
14. The notion of "hauntology" (invented by Jacques Derrida about the specters of Communism) has been recuperated by the ontology of sound recording. It discussed by Jonathan Sterne in *The Audible Past: Cultural Origins of Sound Reproduction*. Durham: Duke University, 2003. Print. And by Simon Reynolds in *Retromania: Population Culture's Addiction to its own Past*. London: Faber

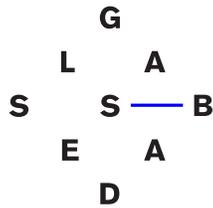
and Faber, 2011. Print. Moreover, Reynolds cites Bazin and Barthes and takes up all the images of presentism and indexicality and applies them to sound: material continuity, embalming, imprint, the phantom, etc.

15. Francis Wolff. *Dire le monde*. Paris: PUF, 1997. Print.

16. Liz Deschenes. "What is a Photograph?" International Photography Center, New York 2014. Exhibition.

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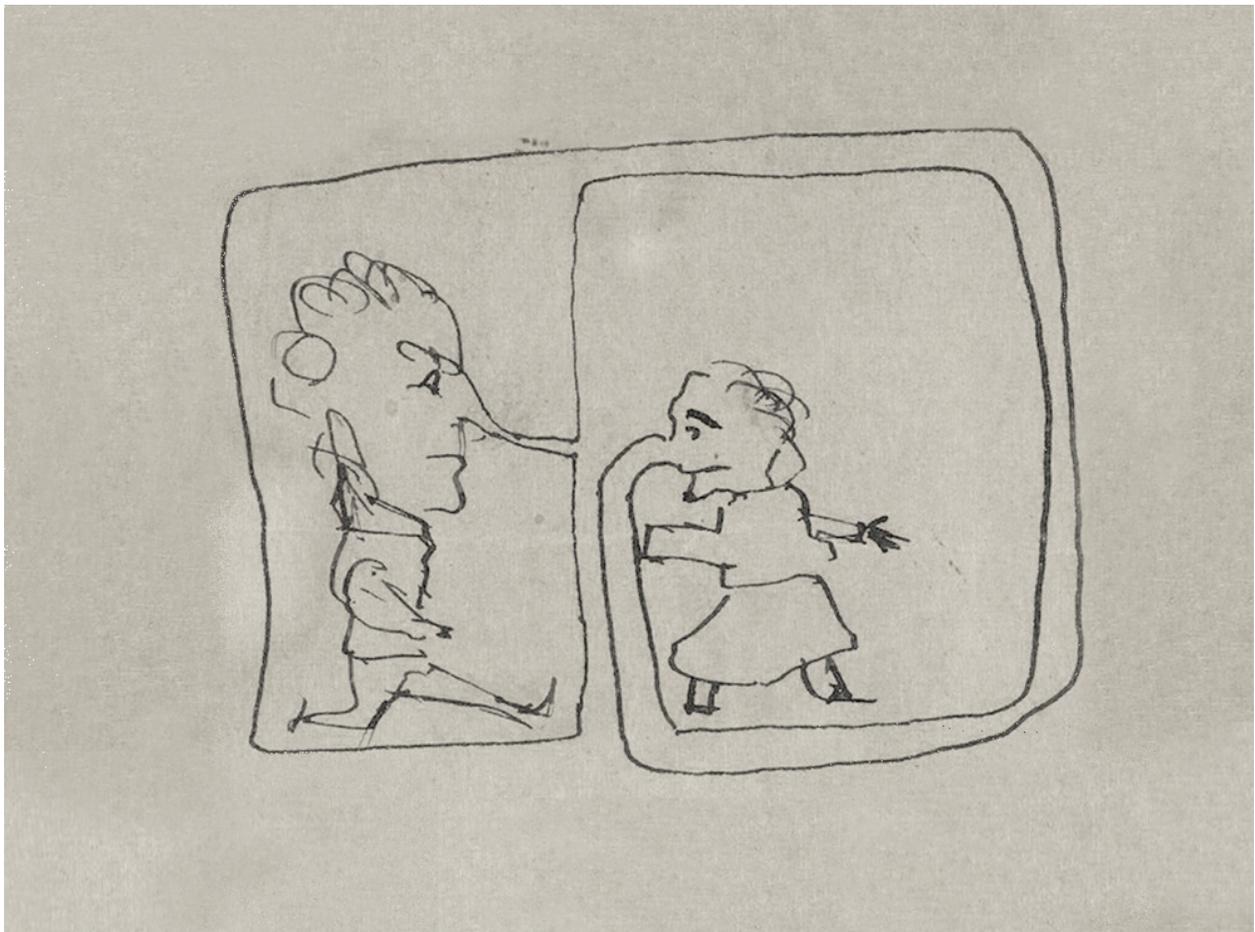
## Multilayered Sites and Dynamic Logics for Transits between Art and Mathematics

Fernando Zalamea

According to Pierre Francastel, “Art and mathematics are the two poles of any logic thinking—the major thinking modes of humanity.”<sup>1</sup> In fact, since Greek Antiquity, art and mathematics have always nurtured a natural dialogue, forming together a tissue of opposed polarities, fruitful tensions and partial osmoses. Concepts, symbols and materials often separate the artist and the mathematician, but a common strategy—to think and imagine through dialectic, relational webs—brings them together. For Francastel, “As the mathematician ... combines schemes of representation and prediction where the real is associated with the imaginary, so the artist confronts elements of representation with other imagination issues. In both cases, the dynamism of a thought that becomes aware of itself by expressing itself and materializing itself in ‘signes-relais’ [“relay-signs”] extends and encompasses elements of experience and those of the logic of the mind.”<sup>2</sup> The *transits* between reality and imagination, the Many and the One, the particular and the universal, the local and the global, constitute the very core of mathematical and artistic creativity. If their *signes-relais* are often different (and, in some cases, the specificity of mathematical *signes-relais* preclude the possibilities the artist has of entering into the realm of mathematics), the *underlying relational protogeometry* which governs the intertwining of the different signs can be extremely close.

In what follows, fragments of that common relational protogeometry will be revealed, and will be applied to an understanding of some strong *weaving dynamics* in contemporary art and mathematics. Referring to *The Glass Bead Game*, Hesse mentions in a 1943 letter how his game and Castalia were meant “not as eternally valid ideals, but

as potential worlds, conscious of their own relativity.”<sup>3</sup> Relationality, potentiality, and relativity, are in fact key twentieth-century forces. Contrary to popular interpretation, entanglement and intersection, built over a non-absolute ground, do not necessarily lead to postmodern skepticism. As Knecht writes at the end of his Waldzell encounter with Designori, “The entire life, whether physical or spiritual, is a dynamic phenomenon, of which the Glass Bead Game contemplates its esthetic side, especially through the framework of rhythmic phenomena.”<sup>4</sup> Following Castalia’s *Magister Ludi*, the mesh of materiality and spirituality, the crossings and echoes along reason and imagination, the intertwined rhythmic spectrum of all senses, the dynamic blend of polarities, are not only still possible, but become really *potentiated* in our transmodern world, as *Glass Bead’s* research platform and journal are demonstrating.



Drawing by Charles Sanders Peirce (The Peirce Papers, Harvard University)

The roots of a unified, non-foundational vision that encompasses art and mathematics as *fragments* of a multidimensional protogeometry of culture can be traced back at least to Novalis (end of the eighteenth century). Riemann surfaces (mid-nineteenth century)

partially solve the tensions and *ramifications* between the Many and the One, in the mathematical domain of complex variables. Peirce's pragmatism (end of the nineteenth century) offers a general architectonics of knowledge, where phenomenological *obstructions* and transits help to explain the emergence of creativity. If we consider fragments and ramifications as *residues*, or *strata*, and we focus our vision on the history of art, Warburg's *Mnemosyne Atlas* (early twentieth century) provides another main reference to unveil the complex protogeometry of cultural exchanges. Profiting from *dual* definitions of art and mathematics proposed by Focillon and Lautman (mid-twentieth century), we can then set up a faithful panorama of the strong dialectics in play. Finally, through the invention of mathematical category theory and its developments in the work of Grothendieck and followers (end of the twentieth century), deep *non-classical* logics and *non-separated* geometries (sites and sheaves in Grothendieck toposes) can be used to further clarify the oppositions and conciliations between art and mathematics.

The first section of this paper presents diverse forms of dialectics between art and mathematics, following Novalis, Warburg, Focillon and Lautman. The second section explores some tensions between the local and the global, both in art and mathematics, profiting from Peirce's architectonics. The third and final section proposes embedding the local/global dialectics in art and mathematics along multilayered surfaces (coming from Riemann surfaces) and multidimensional sites (coming from Grothendieck toposes), governed by continuous, intuitionistic logics.

### 1. Dialectics between Art and Mathematics

Due to the unavoidable opacity of mathematical *signes-relais*, *mathematical creativity* is seldom understood outside its practitioners. Nevertheless, a sustained French tradition has delved into the question,<sup>5</sup> revealing the complex weaving of inventiveness in mathematics. From the concrete (multitude of careful examples) to the abstract (general representation patterns), from a precise reckoning of difference (existence and uniqueness theorems in local frames) to all-encompassing integral views (universal structures and mathematical categories), from syntactical restraint (proof theory) to semantic freedom (model theory), from full control (deduction, rational clearness) to glimpses of error (abduction, imaginative mess), mathematics *breaks* all supposedly rigid forms of knowledge. *Plasticity* then becomes one of the essential characteristics of mathematical thought (see *Section 2*, for an understanding of *conceptual mathematical elasticity*—iteration and deiteration—using Peirce's three cenopythagorean categories).

On another hand, Novalis had admonished that, while *science required plasticity, poetry required exactitude*. In fact, beyond usual prejudices, *artistic creativity* has been built on extreme accuracy. Imaginal invention synthesizes, in unique images, sophisticated webs of correlations of the image with its surroundings, either material or conceptual. As sorts of *residues* (which recall Benjamin's search for remainders in his Paris *Arcades* project), the images *reflect* and *potentiate* the contexts where they are introduced. An emergence of sense comes often from the surprise effect of accurately distorted, limiting images. Artistic *signes-relais* profit from a forceful materiality that can embed polysemy and multiverse problems in the very rawness of matter. In this way, mathematics and art produce a *first dialectics (A)*, tensioning the field of knowledge in opposite, complementary ways (like the polarities in an electromagnetic field): revealing and universalizing in mathematics, blurring and particularizing in art. What becomes essential is that, in *middle grounds*, both art and mathematics converge: the great, singular artistic *chef d'oeuvre* opening up unexpected universal dimensions, and the great, universal mathematical *chef d'oeuvre* projecting itself in equally unexpected, singular models.

In *La vie des formes* (1934), Focillon suggested a definition of art as the space where "*la forme se signifie*"<sup>6</sup> ("form signifies itself"). Thus, art deals with *forms* which have to be *structured*, in order to obtain their significance. *Inversely*, following a *dual* approach, we may think of a definition of mathematics as the space where "*la signification se forme*" ("signification forms itself"). Even if that quote does not appear explicitly in Lautman's *Thèses* (1937), all his work<sup>7</sup> explains how mathematics deals with *structures* which have to be *formed*, in order to obtain their theorematic force. A natural, *second dialectics (B)* between art and mathematics emerges through these dual definitions. In this way, an understanding of the *fabric of tensions between form and structure* grows to be one of the central problems to be studied in the interrelationships between art and mathematics. As we will see in *Section 2*, dialectics (B) can be iterated along several levels—according to Peirce's phenomenological categories and according to transfers along mathematical category theory—which can be explored through *multilayered geometries* and *multivalued logics*.

Novalis had already urged that a superior dialectics has to take into account serious antinomies, and, even beyond clashes of two polarities, has to understand *infinitomies*: Beyond duality, and trivial separation, "science does not begin by an antinomy—or a binomial—rather by an *infinitomial*."<sup>8</sup> The young genius underlines the importance of an "*inversion* of the three logical principles—from which are derived the three logical

antinomies and the three fundamental problems”<sup>9</sup> (the three principles, according to Leibniz, are the principles of identity, non-contradiction, and sufficient reason). In particular, the problem of understanding the contradiction  $p \wedge \neg ()p$  (inverting the principle of non-contradiction, and accepting antinomies) fosters some of the more original insights of the poet. Building on several potentialities of antinomic thinking—“antinomy of intention, project and process ... antinomy of concept and object ... antinomy of proof and solution ...”<sup>10</sup> —Novalis introduces a powerful *relative geometry*, where “time and space are ever interchanging,” where “the law of the excluded middle does not apply,” and where diverse worlds (interior/exterior, mind/nature, culture/science) are “admixed,” forming “part of a continuum.”<sup>11</sup>

Mathematics and art do form part of that *continuum*. For Novalis, “creative imagination” is *tri-composed* of reason, judgment and sensibility.<sup>12</sup> Breaking artificial frontiers, going beyond simple partitions and compartments, art and mathematics enter a *perpetuum mobile* space, to be examined through a sophisticated *topology of transits*. A *third dialectics (C)* between art and mathematics faces then the problem of rendering *continuous* the (apparently) discrete oppositions. In his *Mathematical studies on Murhard* (c. 1798), Novalis writes: “In all sciences one has spontaneously to plasticize [*plastisirt*].”<sup>13</sup>

*Transitions, translations, transferences, transformations, transfigurations*, are repeated terms in Novalis’ writings. The trans/ concept plasticizes all his thinking. Mathematics and art participate strongly in that trans/ philosophy, which, as many cultural movements of the new millennium are showing, is becoming a basic concern of our times. Some alternative journals, open to *non-separated thought*, where art, science and philosophy are well “admixed”—such as *Collapse*, one of the most brilliant adventures of thought produced in the last ten years, and *Glass Bead*, hopefully a brilliant companion in the near future—reflect that trans/ imperative.



Ascent to the Sun (Aby Warburg. 1928. Warburg Library, Cornell University)

Warburg's *Mnemosyne Atlas* (1924-1929) investigates the transformation of images in Western thought and their roots in the Near East. The *Atlas* looks to provide an *orientation* of man's actions inside the weft of culture, and, as the *Mnemosyne* mythological echo suggests, it tries to (re)construct a *site* thanks to an exploration of the *remainders of memory*. For Warburg, the very foundation of the project lies in a precise, creative antinomy: "Image and number as an anti-chaotic polar function of memory serving orientation."<sup>14</sup> Thus, the *very polarity of art* (images) *and mathematics* (numbers) is set to organize, in an explicitly non-chaotic way, all types of *strata, ruins, residues, traces*, proper of historical researches (for a long study on Warburg's connection between antinomic and creative thinking).<sup>15</sup> The *Introduction* to the *Atlas Mnemosyne* unfolds a dozen terms related to "polarité" and "opposition."<sup>16</sup> "The bounding poles of psychic behavior: calm contemplation on the one hand, and orgic fervor on the other"<sup>17</sup> also represent the limiting "regions" of mathematics and art. Along a *dynamical system*, reason and sensibility (or Creation and Life, as in *Death in Venice* [1912]) produce a *fourth*

*dialectics (D)* between mathematics and art, where the principal issue becomes to situate local residues inside global webs, and to understand their new harmonics (or, better, their *non-harmonics*, either creative<sup>18</sup> or theoretical).<sup>19</sup>

## 2. Local/Global Transits in Art and Mathematics: A Peircean Approach

When faced with contemporary art and mathematics, we cannot escape a certain *transitory ontology*,<sup>20</sup> that—at first, terminologically speaking—seems self-contradictory. Nevertheless, though the Greek *ontotetês* sends us, through Latin translations, to a supposedly atemporal “entity” or to an “essence” that ontology would study, there is no reason (besides tradition) to believe that those entities or essences should be absolute and not *asymptotic, governed by partial gluings in a correlative evolution* between the world and knowledge. *Bimodality*, in the sense of Petitot,<sup>21</sup> that is, dynamic movement both in physical and morphological-structural space, is related to such a state of things, where “things” have in fact to be replaced by “processes” (functors, natural transformations and adjunctions in mathematical category-theoretic settings, see *Section 3*). Both prefixes (*trans/, bi/*) offer a suitable ground to understand the wanderings of contemporary art mathematics.

Charles Sanders Peirce<sup>22</sup> had already imagined (or discovered, according to our variable ontological commitment) a wonderful phenomenological tool, which helps to unravel the *multilayered geometry* of the (*trans/, bi/*) situation. Phaneroscopy, or the study of the *phaneron*, that is the complete collective spectrum present to the mind, includes the doctrine of Peirce’s cenopythagorean categories, which observe the universal modes (or “tints”) occurring in phenomena. Peirce’s three categories are vague, general, and indeterminate, and can be found *simultaneously* in every phenomenon. They are interlaced in several levels, but can be *precised* (distinguished, separated, detached) following recursive layers of interpretations, in progressively more and more determined contexts. A dialectics between the One and the Many, the universal and the particular, the general and the concrete, is *multilayered* along a dense variety of theoretical and experimental fibers.

Peirce’s *Firstness* detects the immediate, the spontaneous, whatever is independent of any conception or reference to something else. *Secondness* is the category of facts, mutual oppositions, existence, actuality, material fight, action, and reaction in a given world (two uses of the term “category” should not be confused in this article: “category” alone will refer to a philosophical category, following Aristotle; “category-theoretic,” “category theory,” or “mathematical category” will refer to its technical mathematical sense).

*Thirdness* proposes a mediation beyond clashes, a third place where the “one” and the “other” enter a dialogue, the category of sense, representation, synthesis. As Peirce explains:

*By the Third, I understand the medium which has its being or peculiarity in connecting the more absolute first and second. The end is second, the means third. A fork in the road is third, it supposes three ways. ... The first and second are hard, absolute, and discrete, like yes and no; the perfect third is plastic, relative, and continuous. Every process, and whatever is continuous, involves thirdness. ... Action is second, but conduct third. Law as an active force is second, but order and legislation third. Sympathy, flesh and blood, that by which I feel my neighbor's feelings, contains thirdness. Every kind of sign, representative, or deputy, everything which for any purpose stands instead of something else, whatever is helpful, or mediates between a man and his wish, is a Third.<sup>23</sup>*

Peirce's vague categories can be “tinctured” with key-words: (1) *Firstness*: immediacy, first impression, freshness, sensation, unary predicate, monad, chance, possibility; (2) *Secondness*: action-reaction, effect, resistance, binary relation, dyad, fact, actuality; (3) *Thirdness*: mediation, order, law, continuity, knowledge, ternary relation, triad, generality, necessity. The three Peircean categories interweave recursively and produce a *nested hierarchy* of interpretative modulations.<sup>24</sup> A series of *modes and tones* enter the analysis, and, as we shall presently see, when applied to the dialectics (A)-(D) between art and mathematics, the series helps to explain their deep complexity. The interest of Peirce's method lies in the permanent *iterative possibility* of his categorical analysis (sequences of the form *n.m.p.q ...* with *n, m, p, q* ranging through 1, 2, 3—see examples below). The iteration allows, in each contextual level (*p, q, ...*), further and further refinements of previous distinctions obtained in prior levels (*m, n, ...*). Dynamic knowledge yields progressive *precision* through progressive *prescision*. Intelligence grows with the definition of more and more contexts of interpretation, and the association of finer and finer cenopythagorean tinctures inside each context.

In Peirce's triadic classification of the *sciences*,<sup>25</sup> Mathematics is situated in the first branch (1), along the realm of possibilities. Esthetics appears inside Philosophy (2), and, between the Normative Sciences (2.2), it comes as a First (thus Esthetics lies on the *site* 2.2.1). Art as such does not enter into the space of “sciences”, but it emerges as a web of *forms of material creativity*—see our first dialectics (A)—which lie on the *sites* 3.2.2 or 3.2.3 (material mediations, in order to force sense—classic art, or action, contemporary art). As a consequence, following Peirce's classification of knowledge, mathematics and art

constitute again a forceful polarity (1 *versus* 3.2.3). Now, an *inverse vision* of the triadic tree affords an interesting transit between art and mathematics. For example, if we place the tree on a sheet (as in Peirce's existential graphs,<sup>26</sup> we look at it from the *recto* (1) or the *verso* (3.2.3) of the page, and we *transit through cuts and ramification points* imagined on the page (which correspond to precise existential graphs *calculi* in Alpha and Gamma graphs), we are then "admixing" in careful ways reason and sensibility. *Iteration and deiteration* techniques along the tree are some of Peirce's major discoveries (with profound consequences in logic, which we cannot expand on here.<sup>27</sup> But without delving into too much technical mathematics, we can easily see that the second dialectics (B) between art and mathematics becomes—on the tree—a lattice-theoretic problematic. In fact, on one hand, *duality* is clearly expressed thanks to the *minimum* (1) and *maximum* (3.2.3) numerical indexes of the classification. On another hand, the iteration of mathematics towards art (1(1)→3.2.3), and its inverse deiteration (1(1)←3.2.3), show that a *continuous mediating field* is stretched between the polarities of art and mathematics, as was presupposed by the third dialectics (C). Finally, *strata* and *residues* are well contemplated in Peirce's architectonics, approaching thus our fourth dialectics (D). Through the very iteration of the cenopythagorean categories, objects and concepts lying in a given stratum (*n.m.p.q...*) codify and reflect their upper levels (*n, n.m, n.m.p, ...*), revealing both *transits* and *obstructions* in the iteration/deiteration processes. The conceptual and practical *back-and-forth* between diverse layers is governed by the *pragmatic(ist) maxim*, which naturally encodes Peirce's categories. The maxim asserts that we can only attain knowledge after conceiving a wide range of representation possibilities for signs (firstness), after perusing active-reactive contrasts between sub-determinations of those signs (secondness), and after weaving recursive information between the observed semiotic processes (thirdness). The maxim acts as a *sheaf* with a double support function for the categories: a contrasting function (secondness) to obtain *local* distinctive hierarchies, and a mediating function (thirdness) to *globally* unify the different perspectives. In fact, a broad, conceptual *differential* and *integral* calculus seems be in action. Peirce imagined a universal lattice of forms to *reintegrate* the Many into the One, the local into the global, the particular into the universal, the concrete into the abstract. It is a strategy that anticipated some basic goals of *mathematical* category theory, where apparently different descriptions of objects in diverse *concrete* mathematical categories (combinatory, logical, topological, algebraic, etc.) are reintegrated through their universal behavior in *abstract* mathematical categories (spaces of definition governed by the existence-and-uniqueness quantifier  $\exists!$ ). Art, the second

major pole of human thought according to Francastel, *inverts* the strategy, and *differentiates* global canvases. Material existence is reified, hoping that concrete residues will reflect abstract totalities.

### 3. Multilayered Sites and Dynamic Logics

Hesse's *contamination* of science and literature in *The Glass Bead Game* reifies, in the concrete space of a novel, Peirce's wider *synechism* (from the Greek *syneches*, joining together). One of Knecht's student poems opens up a *geometry of elevation*: "Traversing spaces and spaces ..., the universal spirit does not want to bound us, but to lift us from one degree to another."<sup>28</sup> We are in the presence of a *multilayered site*, from which multiverse visions can be projected to the diverse strata of the architectonics. Our understanding of *contemporary culture* has to be situated in such *multilevel* configurations, emphasizing in particular some key properties: (i) non-separation and continuity, (ii) multiplicity and ramification, (iii) local/global potential gluings. *Non-separation and continuity* refer, on one side, to a topology not forced by points (Hausdorff spaces), thus to spaces where objects (sets) are replaced by processes (sections in a sheaf); and, on the other side, to the mandatory *motto* of our epoch: to reintegrate separated, disciplinary knowledge, as *The Glass Bead Game* novel idealized, and the *Glass Bead* journal tries to realize. *Multiplicity and ramification* refer to the dynamic, magmatic forces of diversity and differentiation which impulse creativity.<sup>29</sup> *Local/global potential gluings* refer to the main *Transmodern* alternative<sup>30</sup> which, beyond just local postmodernism, reintegrates fragments, residues, and ruins, in global *non-absolute* perspectives. Here, the possibility to construct *relative universals* (apparently a contradiction in terms), has become one of the essential guides of our times (see below). As we will see, a sound completion of these properties leads to *dynamic, non-classical* logics which govern the different configurations.

Riemann's theory of functions of complex variable, invented/discovered in his outstanding PhD thesis, incorporate properties (i)-(iii) in precise modes. The thesis, *Fundamental principles for a general theory of functions of complex variables*,<sup>31</sup> introduces new techniques close to (i)-(iii): a double geometric characterization of holomorphic functions, through Cauchy-Riemann equations and conformality—close to (i); Riemann surfaces, in par. V of the thesis, through a description of *paths* in the surface—close to (ii); and, back-and-forth techniques between global analysis and local expansions, through general integral representation theorems—close to (iii). In simple terms, we may now describe the basic idea beyond a Riemann surface as a partial solution to a Many/One

problem. The idea is to represent a *multivalent* algebraic relation between two complex variables thanks to a *multilayered ramification on a continuous surface* which turns a many-one relation into a one-one (univalent) relation. *Multiplicity is both ramified and glued in a universal surface*. The dialectics between discontinuity (many-valuedness, breaks) and continuity (univalence, gluing) is synthesized in a unifying concept. If we could construct Riemann surfaces for fragments of culture, we could be able to describe better the four dialectics (A)-(D) between art and mathematics (the aim of this paper is just to *suggest* it—no such construction has ever been realized, or even dreamed after Valery.<sup>32 33</sup> Indeed, dialectics (A) could then be sub-determined through projections (universal  $\downarrow$   $\rightarrow$  particular) and sections/injections (particular  $\downarrow$   $\rightarrow$  universal), two natural operations on a Riemann surface (see Figure 1, including *modal* operators which model Peirce's Gamma graphs). Dialectics (B) could be imagined through the twists (*forms*) of the surface, which represent their associated mathematical smoothness (*structure*). Closer to dialectics (C), the ramification points of the surface (see Figure 1) would be precisely the sites where discreteness deploys into the continuity of the leaves. Finally, according to dialectics (D), the values of a function at isolated points, in each leaf, could be understood as the remainders, or local residues, of the global behavior of the function on the global surface.

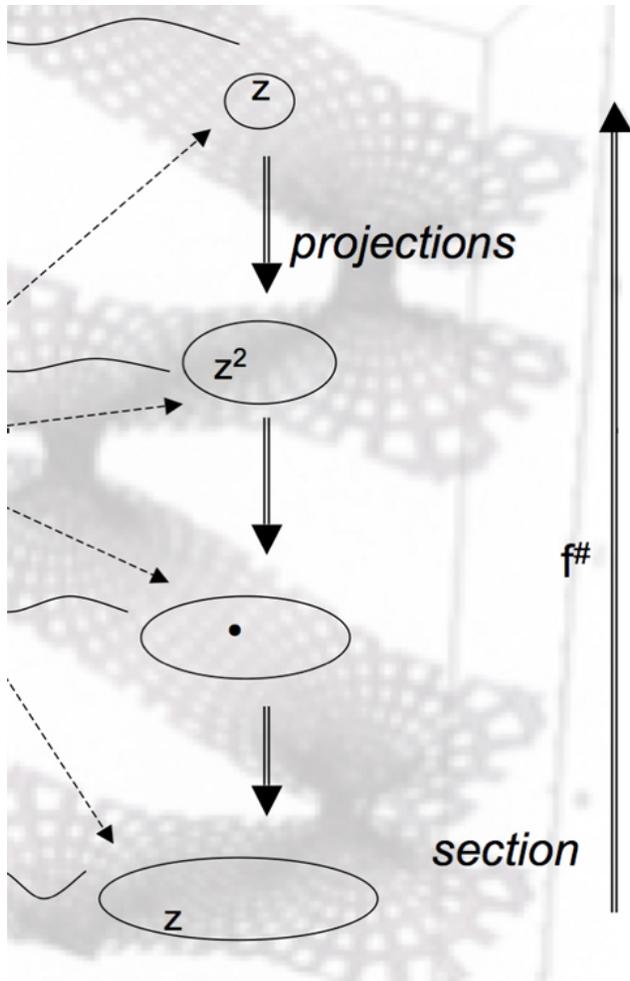


Figure 1. Projections and injections on a Riemann Surface (Zalamea 2010)

As an example, imagine the complexity of Picasso's *Guernica* (1937). We can easily observe that the planar surface of the painting is just an accident of the matter involved, and that the painting has really to be *deployed through many levels* of our imagination.

Conceptually and materially, *Guernica* goes well beyond its driven two dimensions, and it is a wonderful construction of a (bi/, trans/) *chef d'oeuvre*. *Guernica*'s geometry lies on a *multilayered site*, which recalls a Riemann surface, with many ramification points (sense and esthetic spreaders) available at the very *corners* of the architectural panels blurred by Picasso<sup>34</sup> for amazing *textural* details on those ramifications). The universality of Picasso's work rests on the extreme *genericity* of its particulars: dialectics (*A*) is at work in its full compassionate force, encoding *all* human tragedies in a sweeping panorama. Universals are projected, and become really *incarnated* in our flesh. The interplay of form and structure—dialectics (*B*)—synthesizes the technical geniality of *Guernica*. The de/ formations of figures and animals reveal the de/structuration of panic, death, and sorrow. Imagine that you could *project* them on moving, dynamic Riemann surfaces (as

our mind does with local particulars, wounded mouths, hands, wrists): the pain drawn in a cut or a flame, would be projected into our grief, in turn projected into universal affliction. Following dialectics (*C*), the singular and the discrete would be *mathematically* part of the universal and the continuous—as they already are *artistically*. Finally, another of *Guernica's* supreme artistic achievements resides in the complex interplay between local residues (explicit death ruins) and the global destroyed environment (Basque life)—a form of dialectics (*D*). *Guernica's* artistic force is completely exceptional, certainly self-contained, but we can see that a dual, conceptual, multilevel geometric synthesis, can also extend its abundant, never-ending polysemous richness.

The eventual interest for culture of modern (1830-1950) and contemporary (1950-today) mathematics consists, not in the partial modelings that mathematics may offer, but rather in its *help to deploy imagination*. Riemann surfaces stimulate visual and conceptual inventiveness. Looking at them (and *handling* them; they are beautiful *material* constructs) allows transits and possibilities that rigid, classical, non-plastic geometries would prevent. In a similar vein, *Grothendieck toposes* (categories equivalent to categories of sheaves over abstract topologies, 1962) constitute *plastic sites*, specifically open to dynamic variations. Grothendieck toposes unify deep insights on arithmetic (number) and geometry (form)<sup>35</sup>. Beyond Cantorian, classical, static sets, the objects in a topos are to be understood as generalizations of *variable sets* (see Figure 2). Instead of living over a rigid bottom, governed by classical logic, they live over a dynamic Kripke model, governed by *intuitionistic* logic. Beyond the classical example of the separated sheaf of holomorphic functions, a sheaf does *not* have to be separated in a general topos: *points do not have to determine their associated objects*. We can even imagine objects without points, defined only through *flux processes*. A wonderful example is the topos of *actions* of monoids. Such a topos has an underlying classical logic (where the law of excluded middle holds and points are essential) if and only if the monoid is a group. Thus, when we deal with structures which are monoid non-groups, the logic of their action is just *intuitionistic, non-separated*, closer to topological fluxions, deformations, disruptions.

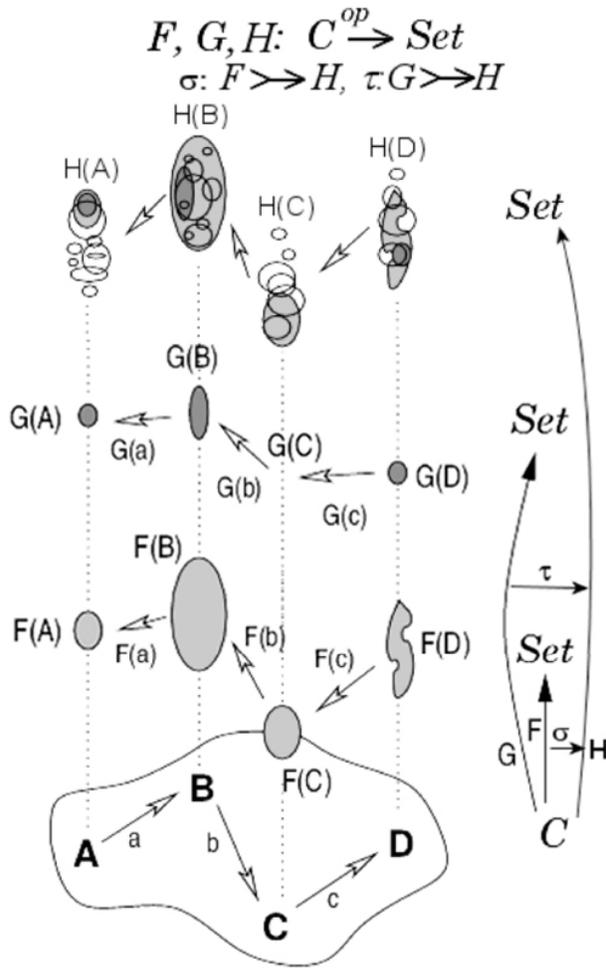


Figure 2. A topos of variable sets (Kostecki 2011)

In a simple *motto*, we may characterize Grothendieck as the greatest mathematician who, after Poincaré, unified Galois and Riemann, the two mathematical geniuses of the nineteenth century.<sup>37</sup> We may thus imagine that, on a conceptual, non-exclusively technical level, Grothendieck toposes generalize Riemann surfaces in some way. Even if the assertion is not mathematically correct (we would have to introduce also Grothendieck's *schemes* into the account), *methodologically* it is fruitful. Figure 1 and Figure 2 show dynamic, relative movements. *Bases change*, no eternal objects are considered. *But* the correlative changes are in turn studied mathematically, and they are incorporated as new objects in an *upper level*. In this way, an *iterated dynamics* emerges a dynamical study of dynamics—which can have a strong influence in cultural studies. As another example, going a little further and *inverting* again our thought, one can deal with toposes whose underlying logics are *dual* to intuitionistic logic. *Paraconsistent logics* (1963) thus appear in the panorama, logics where we can have *local* contradictions *without* forcing *global* contradictions which would destroy the system.<sup>38</sup> It is fairly clear

that the dynamic *logics of art* are either intuitionistic or paraconsistent, but certainly not classical. The dialectics of art and mathematics (A)-(D) already hinted at such a situation, but it is interesting to notice that, (1) if we situate ourselves in a multilayered site akin to art, that is, in some sort of non-well-defined Grothendieck topos of *art actions* (compare with the well-defined topos of monoid actions), (2) if we think *dually*—as art should do with respect to mathematics, and (3) if we allow ourselves to live in a continuous *medium* of contradictions, then we will be approaching many of the strongest forms of contemporary art (as in Caro, Kabakov, or Kiefer<sup>39</sup>).

Of course—going against the usual captions which inform us about fictional characters when films finish—we may assert that our indexing (1)-(3) in the last paragraph is Peircean, and it is certainly *not accidental*. Worse: if we read well, *The Glass Bead Game* must have listed already this combinatory possibility in one of its infinite game versions.

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## Footnotes

1. Our translation. “L’art et les mathématiques sont les deux pôles de toute pensée logique, les modes de pensée majeurs de l’humanité.” Pierre Francastel. *La réalité figurative* (Oeuvres, II). Paris: Denoël / Gonthier, 1965. 21. Print.
2. Our translation. “Comme le mathématicien ... combine des Schèmes de représentation et de prévision où le réel s’associe à l’imaginaire, ainsi l’artiste confronte des éléments de représentation avec d’autres qui relèvent d’une problématique de l’imagination. Dans les deux cas, le dynamisme d’une pensée qui prend conscience d’elle-même en s’exprimant et en se matérialisant dans des signes-relais dépasse, englobe les éléments de l’expérience et ceux de la logique propre de l’esprit.” *Ibid.* 107.
3. Hermann Hesse. *Il giuoco delle perle di vetro* (1943). Milano: I Meridiani / Mondadori, 1978. xxxvii. Print.
4. Hermann Hesse. *Il giuoco delle perle di vetro* (1943). Milano: I Meridiani / Mondadori, 1978. 110. Print.
5. See Henri Poincaré. *L’invention mathématique*. Paris: Institut Général Psychologique, 1908. Print. And Jacques Hadamard. *Essai sur la psychologie de l’invention dans le domaine mathématique* (1943). New York Lectures. French translation by Jacqueline Hadamard, Paris: Albert Blanchard, 1959. Print. Or Alexander Grothendieck. *Récoltes et semailles*. Manuscript, 1985. Web.
6. Cited in Jacques Thuillier. *Théorie générale de l’histoire de l’art*. Paris: Odile Jacob, 2003. 65. Print.
7. Albert Lautman. *Les mathématiques, les idées et le réel physique*. Paris: Vrin, 2006. Print.
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9. Novalis. *Das allgemeine brouillon* (1798/99). Italian translation: *Opera filosofica II*, Torino: Einaudi, 1993. 427. Print.
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15. Fernando Zalamea. *Antinomias de la creación. Las fuentes contradictorias de la invención en Valéry, Warburg, Florenski*. Santiago de Chile: Fondo de Cultura Económica, 2013. Print.
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27. See Fernando Zalamea. *Idem.*
28. Hermann Hesse. *Il giuoco delle perle di vetro* (1943). Milano: I Meridiani / Mondadori, 1978. 465. Print.
29. See Laurent Margantin. *Système minéralogique et cosmologique chez Novalis, ou les plis de la terre*, Paris: L'Harmattan, 1998. Print. For Novalis the mineralogist, as a "volcanic" forerunner.
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39. Fernando Zalamea. "Matemáticas y arte contemporáneo". Ed. Fernando Zalamea. *Rondas en Sais. Ensayos sobre matemáticas y cultura contemporánea*. Bogotá: Universidad Nacional, 2013. 251-267. Print.

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## The Turn of the Canoe

Deneb Kozikoski Valereto

*“I look at Brasília as I look at Rome: Brasília began with a final simplification of ruins.”*

*Clarice Lispector*

Toward the conclusion of “Peregrinations, Visions and the City: From Canudos to Brasília, the Backlands become the City and the City becomes the Backlands,” Nicolau Sevcenko briefly reads João Guimarães Rosa’s profound short story “The Third Bank of the River,” published in *Primeiras Estórias* in 1962. Sevcenko sees Guimarães Rosa’s story as a case of the “thematic and formal” investigations of the possibility of “[r]econciling languages expressive of modernity with the specific characteristics of a society still strongly marked by the weight of its colonial past.”<sup>1</sup> Guimarães Rosa’s narrator tells us about his father, who had a canoe made for him and without notice, rowed to the middle of the river, where he stayed never to leave it again until his son indicated he would take his place. Sevcenko’s use of the term ‘reconciliation’ conjures notions of synthesis and totalities, fragments and irreconcilable pieces, thus instigating the all-too-familiar quandary surrounding modernity and postmodernity. An axis of much intellectual inquiry and debate in the twentieth century, these issues cut across specific territories of Latin American culture. In the introduction to *The Postmodernism Debate in Latin America* (1995), John Beverley and José Oviedo incisively point out that:

*The engagement with postmodernism in Latin America does not take place around the theme of the end of modernity that is so pertinent in its Anglo-American manifestations; it concerns, rather, the complexity of Latin America's own 'uneven modernity' and the new developments of its hybrid (pre- and post-) modern cultures. (José Joaquín Brunner argues that postmodernism is, in effect, the specific form modernity takes in Latin America).<sup>2</sup>*

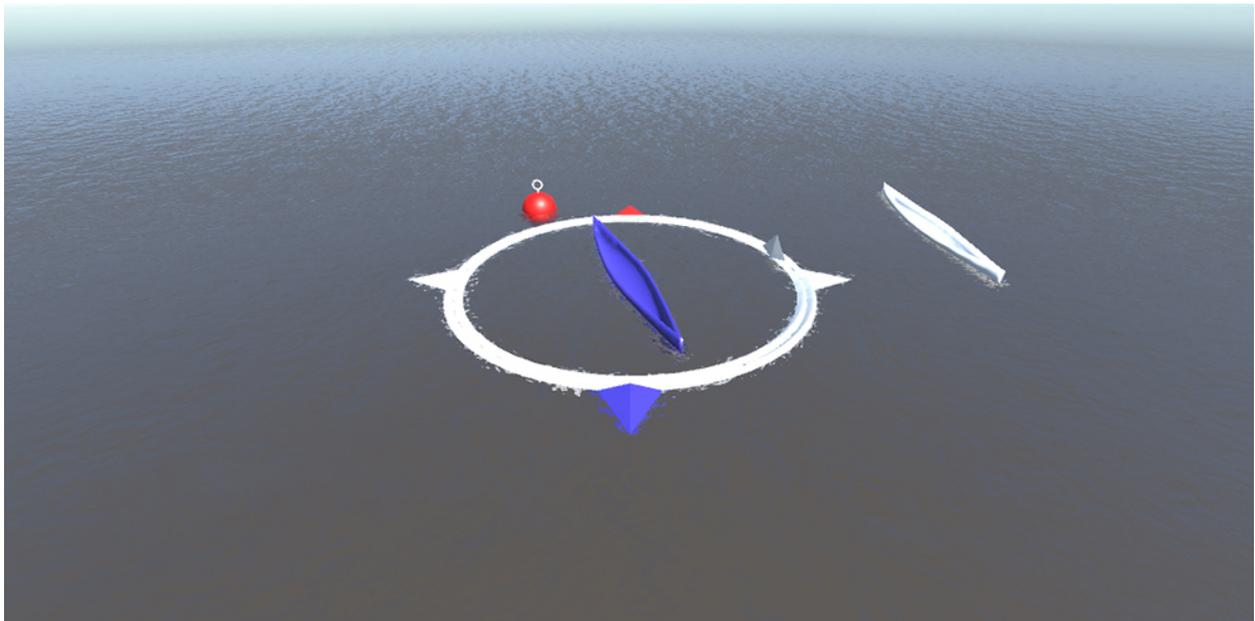
One of the reasons the question of postmodernity in Latin America does not necessarily concern the perception of the end of metanarratives is because of how imperatively projects of modernization ranging from sociotechnical development, literacy and social emancipation have posed themselves. From the nineteenth to twentieth centuries, modernization appeared both as means and objective of the transition from a colonial society to a socially and economically emancipated one. Because of the scale of the investments they required, these projects could not be completely abandoned, nor could they comprehend with stability the distinct hybrid of multi-temporal sociocultural expressions that exist in Latin America.

According to the basic progressive thesis, although colonialism bootstraps the European culture of modernity, it creates the condition for the emancipation of modern Latin American nation-states—that is, for their 'critical' moment in relation to the structures and mechanisms that produced them. This critical moment is simultaneously an expression of autochthony and difference from, and of appropriation and transculturation of enlightenment ideals. What is of concern here, however, are the problems that emerge from the asymmetries that lie on different sides of the trajectory of modernity, because they complicate the legislative, universal power that endows enlightenment ideologies. If the deployment of these ideals in a sociohistorical reality other than that of their emergence enshrines different referents and materials (concretely speaking), do their categorical imperatives remain unshaken?

If the possibility of a negative answer frustrates Western philosophical orthodoxy, it raises further difficulties and opportunities to think about what it means to have a conversation that is not dictated by the "absolute monologue of colonial reason," as Nick Land puts in "Kant, Capital, and the Prohibition of Incest: a Polemical Introduction to the Configuration of Philosophy and Modernity."<sup>3</sup> Land exposes the paradox of the enlightenment in a description of modernity as an "inhibited synthesis," which is consummated in Kant's philosophy: "Kant's 'object' is thus the universal form of the relation to alterity; that which must of necessity be the same in the other in order for it to appear to us. This universal form is that which is necessary for anything to be 'on offer' for experience, it is the 'exchange value' that first allows a thing to be marketed to the

enlightenment mind.”<sup>4</sup> In its absolute monological form, the extension and actualization of modernity in Latin America would not be a problem at all, since what is affirmed in this case is precisely the continuity between the ideals that appeal to the enlightenment mind *regardless* of the material referents that determine the locus of instantiation—it is the same modernity all the way down.

If what is emphasized is not the universality but the differences—the dissonant intervals that repel one from another, then we might be able to conceive of the problem in terms other than recognition and reconciliation. The impetus of this approach is akin to the one François Jullien adopts when he speaks of divergences in *On the Universal: the Uniform, the Common and Dialogue Between Cultures*, “But the concept of *divergence* is a rigorous and combative concept in this respect: by leading us to probe *the point to which* divergences could lead, to measure the distance which opens up between them, it unfolds the cultural and the thinkable to their limit.”<sup>5</sup> Despite my skepticism toward some profound renewal of the culture of the enlightenment emerging from the encounter between modernity as an European ideal and culture, and Latin American modernity as a transcultured (at times ‘postcolonial’) instance, I take the exercise of thinking of the possibility of unbinding universalism, colonialism and modernity in the sense outlined by Jullien—that is, as an opportunity to “[p]robe *the point to which* divergences could lead.”



UCLA Concrete Canoe, Video Game (ACM, ASCE, Jungsu Pak, Theodore Nguyen, 2015)

Such a disentanglement would entail suspending the imperative of the universal as informing and regulating the image of what it means to think. As Land acutely anticipated in his text, this demands (among other things) a consequential engagement with anthropology. The inhibited synthesis whose functioning Land uncovers in “Kant, Capital, and the Prohibition of Incest,” and relates to Lévi-Strauss’s *The Elementary Structures of Kinship* finds a contemporary interlocutor in the “anti-narcissistic” decolonization of thought that Eduardo Viveiros de Castro proposes in the texts gathered as *Cannibal Metaphysics*, where one of the theses advanced is that “[e]very nontrivial anthropological theory is a *version* of an indigenous practice of knowledge.”<sup>6</sup> A nontrivial anthropological theory—an “experimental metaphysics,” as Viveiros de Castro puts it—comes to enter into a disjunctive synthesis with “philosophy conceived as the *sui generis* ethno-anthropological practice of the creation of concepts” oriented towards the “permanent decolonization of thought.”<sup>7</sup> This disjunctive synthesis between anthropology and philosophy would thus be the *possible* point of an uninhibited synthesis between the versions of practices and styles of knowledge that these disciplines study. Equivocation is the challenge that Viveiros de Castro’s conception of Amerindian multinaturalism and perspectivism poses for a project of cultural translation, oriented toward the externalization of reason. “Amerindian perspectivism is a doctrine of equivocation, of referential alterity between homonymous concepts. Equivocation is the mode of communication between its different perspectival positions and is thus at once the condition of possibility of the anthropological enterprise and its limit.”<sup>8</sup> Drawing from extensive study of Amerindian collectives, Viveiros de Castro presents, under the name ‘multinaturalism,’ a perspectivist metaphysics which undermines the political exigencies of the universal; equivocation effectively posits the universal as a case of mistaken identity; a mutual stabilization of reciprocal apperceptions is represented as the ‘same’ object. Equivocation is fragile, unsuitable from grounding compromises with the weight of the past.

Read as a narrative of possible reconciliation, Guimarães Rosa’s “Third Bank” seems to present a scenario that corroborates modern progression: traditional life in the interior of Brazil is dissolved, the family is ruptured, the mother and sister move to a city, a brother to another, while a third son stays and maintains his tie with the father, who shows no signs of leaving the third bank of the river. Here, perhaps, we would be tempted to read the father as having lost touch with actuality; the son also asks if he has not gone mad, as someone who remains stuck in his archaic ways despite modernity’s transformations. But the third bank of the river can also be read as a manifestation of

irreconcilable convergences, as a place that is determined neither by vital needs nor by stagnation. “Doesn’t the father ever get sick?” asks the son. “And the constant strength of the arms, to have a hold on the canoe, resisting, even in the excess of floods, at the high water, there when everything dangerous flows with the enormous thrust, those bodies of dead animals and tree branches coming down—of fright, crashing.”<sup>9</sup> The story does not capitulate to the literary determinations of either realism (doesn’t the father ever get sick?) or myth (as realm or discourse ‘outside’ history); nor does it reconcile languages expressive of modernity with a colonial past. To a great extent this is due to the seemingly trivial, but also profound, fact that the narrative is a literary and philosophical artifact of a supposedly ‘unintelligible’ event.

In this sense, Sevcenko’s reading of the story is revealing precisely where it insists on an interpretation of the narrative as determined by history: “Written at the beginning of the 1960s, it reflects the cultural climate of the time marked by a catalyzing event, which mobilized the creative energies of the country: the foundation of its new capital, the planned city of Brasília.”<sup>10</sup> The site of construction of Brasília is at once a ‘nowhere’ and a ‘location’ *par excellence*: far from the coastal regions as metropolitan loci; the product of a deliberate gesture of centralization and geometrization of space. Sevcenko’s Brasília encapsulates this configuration:

*The Capital of Hope, as it was called, would be, at one and the same time, the origin of the “cosmic race” as conceived by one of the influential figures behind Mexican muralists, José Vasconcelos, and the centre which heralded the “third way”—the society resulting from the emancipation of colonial peoples from their past, as well as from the imperialist pretensions of powers locked into the Cold War. Brasília would be the “third bank,” the bridge between an undesirable past and a still impalpable future, the materialisation of the impossible.*<sup>11</sup>

Sevcenko’s framing of Brasília as a “third bank” is symptomatic of the proliferation of visions in Latin America, where Brasília is, in the words of José Miguel Wisnik, “mirage of modern Brazil and modern Brazil as mirage.”<sup>12</sup> Brasília embodies the double modern impulse towards the ceaseless rejection of previous foundations—such as the old capital, Rio de Janeiro—and the insistent establishment of a new edifice, marking the supposed passage into the modern era.

In the face of his father’s decision to take his canoe to the middle of the river, the narrator-son, in Sevcenko’s words, “[h]esitates and reflects with the reader on the significance of this act, of his father’s invention of an impossible place, which does not exist, and asks if the reader would undertake to enter this place, becoming paralyzed like

the father in a permanent mobility, enclosed in the continuous flow of atemporality.”<sup>13</sup> What Sevcenko assumes as a given is the status of the third bank of the river as an impossible place, which could as well be understood by reversing the direction, so that the third bank becomes the locus where *place* becomes an infinite problem. As Deleuze puts it in *The Logic of Sense*, “Sense is always a double sense and excludes the possibility that there may be a ‘good sense’ in the relation.”<sup>14</sup> To take this reversal further, the third bank of the river allows the perception of “permanent mobility” and the “continuous flow of atemporality” to meet their Möbius-like inside-outs: *impermanent stasis* (or immobile transience) and *discontinuous damming of temporality*. If we see the third bank of the river as the (non)locus where all these visions meet and multiply, the framing of the text as standing for a relatively conventional narrative of modernity in Latin America must be displaced by one that explores the paradox of the third bank. Is the boat paralyzed in a permanent mobility or is it floating through an impermanent stasis? The point is not to choose either, but to arrive at the point at which both can be placed in communication. Guimarães Rosa stages the gestures that lead to conception of the third bank of the river as a place for a ‘horotic’<sup>15</sup> meditation. The supposedly unthinkable act of staying at the margin of the margin thus founds both the communication between ‘oppositional’ flows of sense, and a contemplation of the margin itself, otherwise impossible from ‘either’ side of the river.



Rio Negro, NASA Modis Satellite (2008)

The ending of the story brings to the fore the multiple directions that aggregate at the third bank in a language that does not yield easy referents. After failing to take his father's place on the canoe, the narrator-son says, "*Sou o que não foi, o que vai ficar calado*"<sup>16</sup> – "I am what was not, what will remain silent." By not taking his father's canoe at the third bank of the river he breaks what would be a linear patrilineal genealogy, establishing another one by connecting with a temporality that "was not." Notice the impersonal aspect of this temporality in the third person preterit '*foi*,' instead of the first person '*fui*.' This impersonal temporal trajectory leads the narrator-son to think that in death he might *at last* be on the canoe. "*Mas, então, ao menos, que, no artigo da morte, peguem em mim, e me depositem também numa canoinha de nada, nessa água, que não pára, de longas beiras: e, eu, rio abaixo, rio a fora, rio a dentro—o rio.*"<sup>17</sup> "But then, unless that in the fact of death they take me, and place me too in any little canoe, in this water that doesn't stop, of long margins, and I, downriver, out the river, into the river—the river." In virtue of being the locus of convergence between impersonal temporalities—"o que não

*foi*” and “*o que vai ficar calado*”—a past that did not come to be and a future that will remain silent, the narrator-son’s intention of taking the canoe after his death is not productive of an imaginary; the discontinuity of the father-canoe-son series prevents its circumscription within the temporal scope of modernity. The canoe bifurcates destinies and functions as a singularization of fate from the point of view of the father and of the son, and this effectively breaks the linear genealogy and identity<sup>18</sup> of the canoe. The father effectively stays in the canoe in life; the son potentially embarks on the canoe in death.

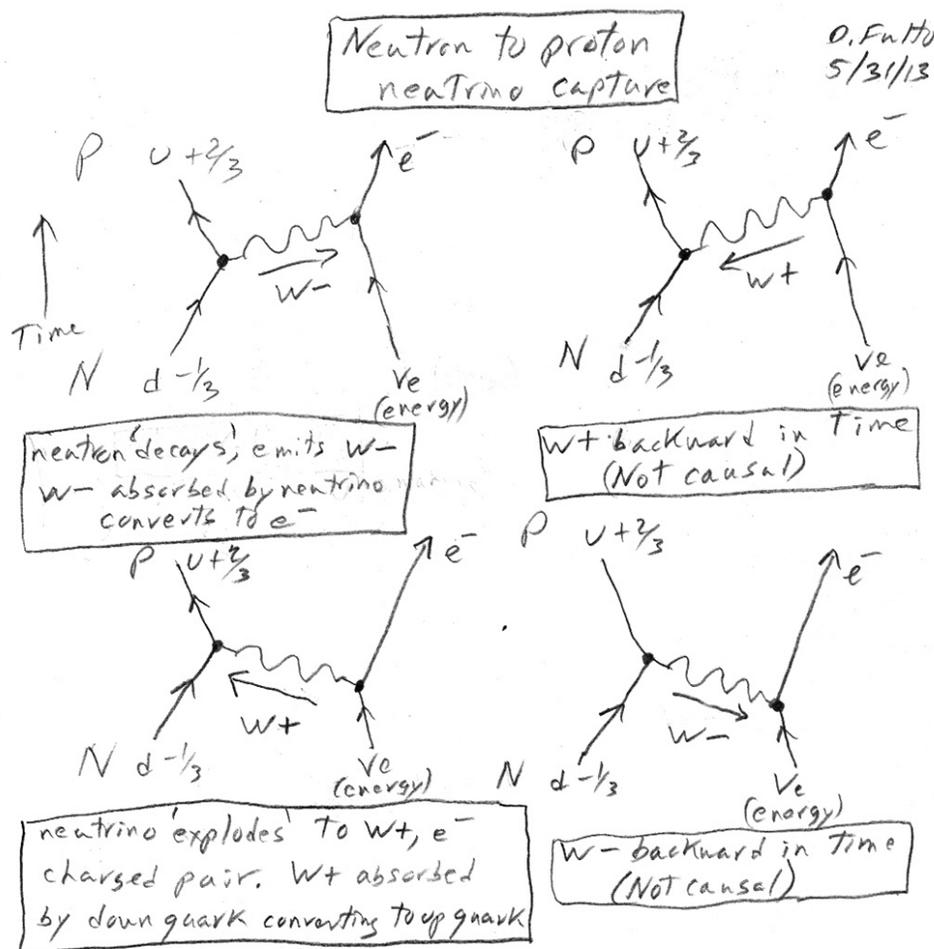
The conceptual theme of the margin, iconic and paradigmatic in the intellectual traditions of thought on modernity in Latin America, is retrieved and conceptualized with a new force by Fernando Zalamea in *América una trama integral—Transversalidad, bordes y abismos en la cultura americana, siglos XIX y XX*. As a margin of Western traditions, Latin America is “[l]ugar de fronteras y de tránsitos,”<sup>19</sup> a place of frontiers and transits, in geographic and historical terms.

*Extremidad, límite o espacio en blanco, el margen representa, física y simbólicamente, aquello que queda de lado, alejado de un conjetural centro. Sin género y sin lugar, el margen es, sin embargo, precisamente gracias a su indefinición y su genericidad, un concepto de una extraordinaria riqueza y ductilidad para poder ver más ampliamente el mundo [...].*<sup>20</sup>

*Extremity, limit or blank space, the margin physically and symbolically represents that which stays on the side, away from a conjectural center. Without kind and place, the margin nevertheless is, precisely because of its indefinition and genericity, a concept of extreme ductility to more amply see the world [...].*<sup>21</sup>

Following Zalamea’s conception of the architecture and topos of Latin American culture, the distances between the ‘panoptic,’ synthetic vision of Latin America as margin in the microscopic instance of Brasília, are traversed by a *telescopic*, transversal movement: “*Una propiedad telescópica de la cultura entra entonces en juego, cuando los más diversos fragmentos de la cultura se reflejan unos en otros—agrandando las imágenes de objetos lejanos.*”<sup>22</sup> “A telescopic property of culture is thus in play when the most diverse fragments of culture are reflected in each other—enlarging the images of distant objects.”<sup>23</sup> Zalamea’s ‘semiotic’ conception of Latin America as margin of the West, culturally and geographically, accounts for the transits of information and perspectives that are generated by its intellectual currents. This semiotic and topological approach thus shifts the focus of the discussion away from the supervision of conceptual purity under universal imperatives to one on techniques and modes of communication, transit

of information, and the transformation of the concept. As Zalamea puts it in “Peirce and Latin American ‘Razonabilidad’: Forerunners of Transmodernity”: “[B]oth Peirce’s system and Latin American TRANS culture help to reinterpret universals as partial invariants of a logic of change, where the *borders of reason and sensibility* appear as objects of reason on their own right.”<sup>24</sup> The reinterpretation of universals as “partial invariants of a logic of change” is itself a shift that occurs through a transmodern<sup>25</sup> movement that cuts across modernity and postmodernity, and as such is not spatiotemporally circumscribable by either. In *América*, Zalamea sees “The pertinence of transmodernity as consisting of its possibility of registering accelerations and decelerations (García Canclini, Martín-Barbero), connections, superpositions, and links [...]”<sup>26</sup>



Four Feynman diagrams (Donald E. Fulton, 2015)

Alongside these possibilities, telescoping and translation, traversal and equivocation are valuable semiotic and transcultural techniques of communication and transformation between styles of epistemic practices. When it crosses the margin, a place of transit and

flow, knowledge emerges as ‘material,’ or ‘information,’ rather than an ‘effect’ of conceptual purity. Viveiros de Castro’s proposal of translation also approaches the goal of an uninhibited philosophy: “Good translation succeeds at allowing foreign concepts to deform and subvert the conceptual apparatus of the translator such that the *intention* of the original language can be expressed through and thus transform that of the destination. *Translation, betrayal...transformation.*”<sup>27</sup> In this sense, reconciliation designates both an undesirable and unviable means and objective of encounters between languages and cultures, styles of epistemic practices, and distinct temporal series. On the theme of betrayal, perhaps one of the most pertinent instances of the tipping of positions between alliance and enmity is Werner Herzog’s film *Fitzcarraldo*, where Fitzcarraldo’s modernist dream of an opera house in the confines of the Amazon forest leads him to take up a role in the rubber economy as to acquire a ship to reach the construction site. Taking Fitzcarraldo for some kind of god, a potentially hostile indigenous tribe helps him move his ship over the mountain so as to avoid a dangerous passage, only to seize control of the ship for their own purposes. Guimarães Rosa’s “The Third Bank of the River” and Herzog’s *Fitzcarraldo* suggest that at the limit of the controlled navigation of the canoe or the boat lies the current of the river, itself a gripping border between reason and sensibility. The former is a study of the third bank as impossible place, and locus where place becomes an infinite problem. The father studies the dissonant simultaneity between a *continuous flow of atemporality* and an *impermanent stasis*. It is from the perspective of the son, anchored outside the river and in charge of the telling of the story (narrative), that this task is presented as ‘unintelligible,’ which is all the more reason to undertake it. The immobile transience of the father’s canoe contrasts with the crash of Fitzcarraldo’s abducted ship, plotted by the indigenous people to appease the spirit of the rapids—that is, to reestablish balance in the flow of the river. Perhaps the latter can be seen as a daring, albeit fictional, exercise in a non-Western style of cybernetics in its many senses and transdisciplinary forms.

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## Footnotes

1. Nicolau Sevcenko. “Peregrinations, Visions and the City: From Canudos to Brasília, the Backlands become the City and the City becomes the Backlands.” *Through the Kaleidoscope: The Experience of Modernity in Latin America*. Ed. Vivian Schelling. London: Verso, 2000. 100. Print.
2. John Beverley, Michael Aronna, and José Oviedo, eds. *The Postmodernism Debate in Latin America*. Durham: Duke UP, 1995. 4. Print.

3. Robin Mackay and Ray Brassier, eds. *Fanged Noumena: Collected Writings 1987-2007*. Falmouth: Urbanomic, 2011. 74. Print.
4. *Ibid.* 67.
5. François Jullien. *On the Universal the Uniform, the Common and Dialogue between Cultures*. Cambridge: Polity, 2014. 152. Print.
6. Eduardo Batalha Viveiros de Castro. *Cannibal Metaphysics: For a Post-Structural Anthropology*. Trans. Peter Skafish. Minneapolis: Univocal, 2014. 42. Print.
7. *Ibid.* 91-92.
8. *Ibid.* 87.
9. João Guimarães Rosa. *Primeiras Estórias*. 5th ed. Rio de Janeiro: Livraria José Olympio, 1969. 35. Print. Although *Primeiras Estórias* has been translated into English, the passages cited here are my own translations, and are informed both by the theories discussed here and by divergences from the existing translation. See *The Third Bank of the River and Other Stories*. Trans. Barbara Shelby. New York: Alfred A. Knopf, 1968. Print.
10. Sevcenko. 101.
11. *Ibid.* 101-102.
12. José Miguel Wisnik. *Sem Receita: Ensaios E Canções*. São Paulo, SP: Publifolha, 2004. 124. Print.
13. Sevcenko. 101.
14. Gilles Deleuze. *The Logic of Sense*. New York: Columbia UP, 1990. 34. Print.
15. Proposed by Giovanni Maddalena and Fernando Zalamea, *horotics* “[p]retends to open the way to general forms of reasoning beyond the polarity analysis/synthesis.” “A New Analytic/Synthetic/Horotic Paradigm. From Mathematical Gesture to Synthetic/Horotic Reasoning.” *European Journal of Pragmatism and American Philosophy* VI:2 (2012): 212. Web.
16. Guimarães Rosa. 37.
17. *Ibid.* 37
18. As Maddalena and Zalamea put it, “A *horotic* judgment (from *horos*, border) is a judgment that is blind to identity through changes.” “A New Analytic/Synthetic/Horotic Paradigm. From Mathematical Gesture to Synthetic/Horotic Reasoning.” 210. Web.
19. Fernando Zalamea. *América—Una Trama Integral: Transversalidad, Bordes y Abismos en la Cultura Americana*. Bogota: Universidad Nacional de Colombia, 2009. 197. Print.
20. *Ibid.* 198.
21. My translation.
22. *Ibid.* 205.
23. My translation.
24. “Peirce and Latin American ‘Razonabilidad’: Forerunners of Transmodernity.” *European Journal of Pragmatism and American Philosophy* I:1 (2009): 1. Web.

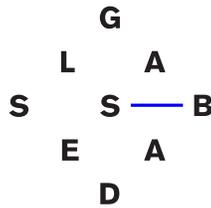
25. *Ibid.* 1. Zalamea describes Rosa María Rodríguez Magda's transmodernity as both a "diachronic and methodological" term.

26. My translation. 274.

27. Viveiros de Castro. 87.

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## The Theory of Topos-Theoretic ‘Bridges’—A Conceptual Introduction

Olivia Caramello

### Introduction

Mathematics is divided into several distinct areas: geometry, number theory, algebra, analysis, mathematical logic, and so on. Each of these areas has evolved throughout the years by developing its own ideas and techniques, and by now has reached a remarkable degree of specialization. Now, even more than in the past, we feel the need to unify theories that could intra-disciplinarily connect different areas of mathematics with their different sets of concepts, objects, and methods, in new and powerful ways, hence providing effective tools for solving long-standing problems. It has happened several times that solutions to profound problems in one field have first, or only, been obtained by using methods from other fields, and this indicates that Mathematics should be seen as a coherent whole rather than a collection of separate fields. Think for example of analytic geometry, which allows the study of geometrical shapes using algebraic manipulation, or the Grothendieckian notion of spectra, which allows the study of discrete objects using a geometric continuous intuition.

The importance of ‘bridges’ between different areas lies in the fact that they make it possible to transfer knowledge and methods between the areas, so that problems formulated in the language of one field can be tackled (and possibly solved) using techniques from a different field, and results in one area can be appropriately transferred to results in another.

A few years ago, I had the intuition that the theory of Grothendieck toposes could provide a powerful means for unifying different mathematical theories. More precisely, I imagined that the possibility of representing toposes in multiple ways could be exploited for building 'bridges' interconnecting different theories and allowing a transfer of information between them.

Toposes are abstract logical concepts that lie at a level of generality which is ideal for shedding light on Mathematics as a whole. To any mathematical theory of a very general nature (algebraic, geometrical, etc.) one can associate a topos, called the classifying topos of the theory, which embodies its essential features (i.e., precisely those features which are invariant under a general notion of theoretical equivalence). This enables us to study theories by studying their classifying toposes. Different theories may be classified by the same topos; this means precisely that they describe the same structures in different languages. The existence of different theories classified by the same topos translates, at the technical level, into the existence of multiple representations for that topos. The latter can then be used as a 'bridge' for transferring properties, notions and results across those theories.

Throughout the past years, I have developed a set of intra-disciplinary methods and techniques for effectively using toposes as unifying 'bridges,' and, in doing this, I have uncovered a number of connections between different mathematical theories that were previously hidden and, in many cases, even unsuspected. Initially, in 2010, my view was supported by the results obtained in my Ph.D. dissertation. My subsequent work brought new evidence every year, some of which provided the solution to long-standing problems. By now a substantial body of mathematical results has been produced: this includes a number of deep applications into distinct fields such as Algebra, Geometry, Topology, Functional Analysis, Model Theory, and Proof Theory.

The purpose of this article is to give a conceptual introduction, accessible to non-specialists, to the theory of topos-theoretic 'bridges.'<sup>1</sup> The last section of the paper is more technical and requires a basic familiarity with logic and category theory to be properly understood.<sup>2</sup>

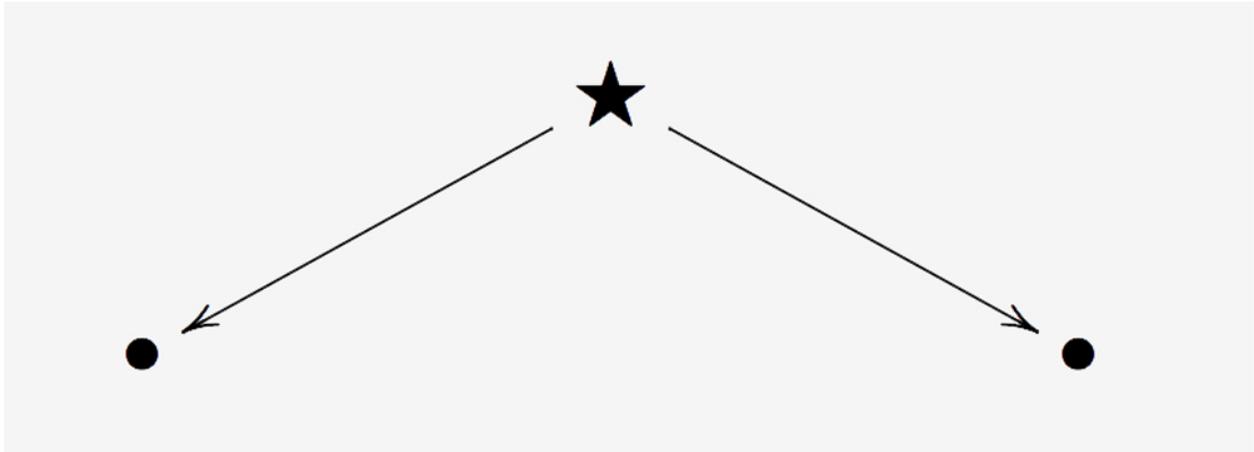
### **The Concept of Unification**

Before we proceed any further, let us first clarify the term 'unification,' as it is somewhat ambiguous and can be used with different meanings.

### 'Static' and 'Dynamic' Unification

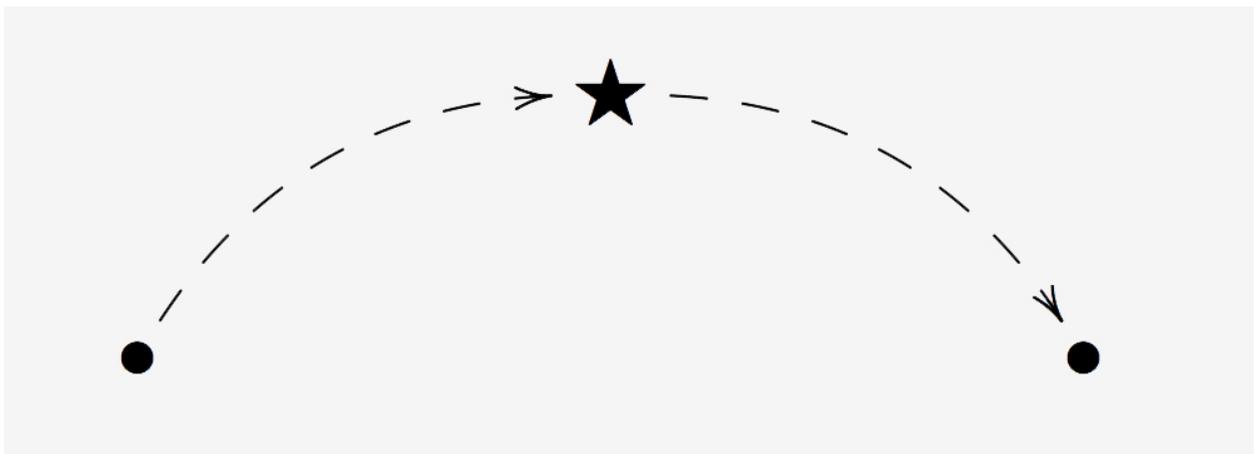
We can distinguish two different kinds of unification: 'static' and 'dynamic.'

. With 'static' unification (through *generalization*), two concepts are seen to be special instances of a more general concept:



Results that apply to the general concept may be *specialized* to yield results on the two more particular concepts.

. With 'dynamic' unification (through *construction*), on the other hand, two objects are related to each other through a third one (usually constructed from each of them), which acts as a 'bridge' enabling the transfer of information between them:



The transfer of information arises from the process of 'translating' properties (or constructions) on the 'bridge object' into properties (or constructions) on the two objects.

We call the first form of unification 'static' in light of the fact that recognizing two different concepts as particular cases of a more general one does not in and of itself offer a way for transferring information between them. For example, the fact that both

preorders and groups are particular instances of the general notion of category does not in and of itself provide a means of transferring results about preorders to results about groups, or vice versa.

On the other hand, the second form of unification allows a 'dynamic' transfer of information between the two given objects. Indeed, the third object which is associated or constructed from each of the two objects admits two different 'representations,' corresponding to the two different ways of constructing it from each of the two objects. Such an object thus yields 'bridges' between the two given objects in the sense that information can be transferred between them by translating properties of (or constructions on) the bridge object into properties of (or constructions on) the two objects, by exploiting its two different representations.

Let us illustrate the difference between these two kinds of unification using some notable mathematical examples.

By providing a system in which all the usual mathematical concepts can be expressed rigorously, Set Theory represented the first serious attempt of Logic to unify Mathematics, at least at the level of language. Later, Category Theory provided an alternative abstract language in which most of Mathematics can be formulated and, as such, has represented a further advancement towards the goal of 'unifying Mathematics.' Anyway, both of these systems realize a 'static' unification in that, whilst each of them provides a way of expressing and organizing Mathematics in one single language, they do not in and of themselves offer effective methods for an actual transfer of knowledge between distinct fields.

On the other hand, the theory of topos-theoretic 'bridges' provides a systematic way to compare distinct mathematical theories with each other and to transfer knowledge between them. In this setting, the two objects to be related to each other are distinct mathematical theories which share a common 'semantic core,' while the bridge object is a Grothendieck topos representing precisely this common 'core.'

As a given 'bridge object' can generally interconnect not just two objects but many different pairs of objects, so in the topos-theoretic setting, for each topos there exist infinitely many different mathematical theories associated with it (through the classifying topos construction).

Other instances of dynamic unification certainly occur in Mathematics; in fact, invariants are always sources of 'bridges' between objects on which they are defined. So, for example, the fundamental group of a topological space can be used as a bridge for transferring information between topological spaces, in the sense that if two topological

spaces have isomorphic fundamental groups, then certain topological properties, such as simple connectedness, can be transferred across the spaces. Similarly, groups can be used to classify geometries, as in Klein's Erlangen Program, etc.

The startling aspect of toposes is that, unlike most of the invariants considered in Mathematics, they allow us to compare and effectively interconnect mathematical theories that may belong to several different subfields of Mathematics.

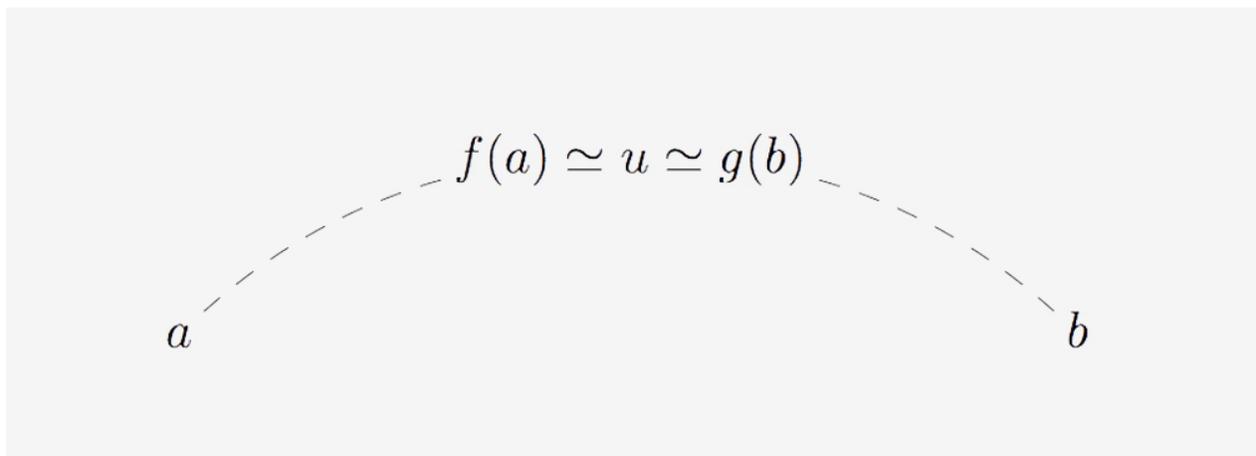
### The Idea of 'Bridge'

One is generally interested in comparing pairs of objects between which there is some kind of relationship.

In order to transfer information between objects related by a given relationship, it is thus of fundamental importance to identify (and, possibly, classify) the properties of the objects that are *invariant* with respect to that relationship.

Depending on the cases, this can be a reasonably manageable task or a hopelessly difficult one. In fact, a relationship between two given objects is generally an abstract entity, which lives in an ideal context that is normally different from that in which the two objects lie.

It thus becomes of crucial importance to identify more *concrete* entities that could act as 'bridges' connecting the two given objects. We can think of a *bridge object* connecting two objects  $a$  and  $b$  as an object  $u$  which can be 'built' from any of the two objects  $a$  and  $b$ , and which admits two different representations  $f(a)$  and  $g(b)$  related by some kind of equivalence  $\simeq$ , the former representation being in terms of the object  $a$  and the latter in terms of the object  $b$ :



The transfers of information arise from the process of 'translating'  $\simeq$ -invariant properties of (or constructions on) the 'bridge object'  $u$  into properties of (or constructions on) the two objects  $a$  and  $b$  by using the two different representations of  $u$ . Notice that the invariance with respect to  $\simeq$  is essential in order to be able to regard the given property of (or construction on)  $u$  both from the point of view of  $a$ , by using  $f$ , and from the point of view of  $b$ , by using  $g$ . Of course, such a 'bridge' is more or less useful depending on whether the 'encodings'  $f$  and  $g$  are sufficiently well-behaved to allow genuine 'unravellings' of the given property of (or construction on)  $f(a)$  (or  $g[b]$ ) in terms of properties of (or constructions on)  $a$  (respective of  $b$ ).

The idea of 'bridge' is strictly related to that of 'invariant construction.' Given two sets  $I$  and  $O$ , and two equivalence relations  $\simeq_I$  and  $\simeq_O$  respectively on  $I$  and on  $O$ , we may define an invariant construction  $f: (I, \simeq_I) \rightarrow (O, \simeq_O)$  is a function  $f: I \rightarrow O$  which respects the equivalence relations (i.e., such that whenever  $x \simeq_I y$ ,  $f[x] \simeq_O f[y]$ ). We say that  $f$  is conservative if it reflects the equivalence relations (i.e., whenever  $f[x] \simeq_O f[y]$ ,  $x \simeq_I y$ ). Given an invariant construction  $f: (I, \simeq_I) \rightarrow (O, \simeq_O)$ , a bridge object connecting two objects  $x, y \in I$  is an object  $b \in O$  such that  $b \simeq_O f(x)$  and  $b \simeq_O f(y)$ . Given a conservative invariant construction  $f: (I, \simeq_I) \rightarrow (O, \simeq_O)$ , bridge objects in  $O$ , considered up to  $\simeq_O$ -equivalence, can be thought of as classifying objects, since they can be taken as canonical representatives of  $\simeq_I$ -equivalence classes.

Of course, a 'bridge' of this kind is most useful in classifying  $\simeq_I$ -invariant properties in cases in which it is more manageable to work with objects of type  $O$  than with objects of type  $I$ , or when the relation  $\simeq_O$  is more tractable than the relation  $\simeq_I$ .

As we shall see in section IV, in the context of the theory of topos-theoretic 'bridges' the objects to be compared with each other are mathematical theories (formalized within a kind of first-order logic), while the invariant construction is given by the classifying topos construction.

### Structural Translations

The bridge method can be interpreted linguistically as a methodology for *translating concepts* from one context to another. But which kind of translation is this? Generally speaking, we distinguish between two essentially different approaches to translation:

1) the *'dictionary-oriented'* or 'bottom-up' approach, consisting in a dictionary-based renaming of the single words composing the sentences, and  
2) the *'invariant-oriented'* or 'top-down' approach, consisting in the identification of appropriate concepts that should remain invariant in the translation, and in the subsequent analysis of how these invariants can be expressed in the two languages. As would be expected, translations of the former kind, though occasionally useful, are not intrinsically profound in that they do not change the 'shape' of the sentences on which they operate and hence do not provide significantly different ways for conveying a certain message. On the other hand, the invariant-oriented translations are liable to significantly change the syntactical form used to express a certain meaning, and thus to generate new insights and points of view on the given message. We shall come back to this topic in section III.B.

Translations across distinct mathematical theories realized through *bi-interpretations* between them are of the former kind. Indeed, bi-interpretation acts as a sort of dictionary for translating formulae written in the language of the first theory into formulae written in the language of the second. On the other hand, 'bridge-based' translations, and in particular topos-theoretic ones, are of the latter kind. In fact, in the context of the theory of topos-theoretic 'bridges,' the invariant properties are topos-theoretic invariants defined on toposes, and the expression of these invariants in terms of the two different theories is essentially determined by the *structural relationship* between the topos and its two different representations.

### Some Examples of 'Bridges' in Science

In order to illustrate the concept of the 'bridge' as explained above, let us discuss a few scientific situations that can be naturally interpreted in terms of 'bridges.'

#### Astronomy: The 'Classifying Star' of a Planet

The universe is composed of several stars, around which revolve certain bodies, called planets. Different planets can revolve around a given star, but every planet revolves around a single star, which we call the planet's *classifying star*.

The trajectory that a given planet makes around its classifying star is determined by two sets of ingredients, namely the parameters determining the ellipse and the period of revolution around its classifying star. This pair (ellipse parameters and period of revolution) for a given planet determines its orbit and its classifying star. The classifying star can be identified uniquely from any planet that is classified by it (equivalently, from

the pair associated with it), and represents the 'right' point of view from which one should observe it (in fact, the elliptic motion of a planet looks very weird if observed from any other point of view than one of its foci).

Different planets revolving around the same star can be studied in relation to each other using properties of the common classifying star, which therefore acts as a 'bridge object' across them. In fact, there are natural relationships between properties of planets and properties of the stars around which they revolve.

To have an idea of the use of 'bridges' in Astronomy, think for example of Kepler's laws. The property that all the planets revolving around a given star have elliptic orbits can be regarded as an invariant property of stars (or, more generally, of bodies around which other bodies revolve). The concrete orbit of a given planet can be seen as arising from the process of expressing this abstract invariant 'the orbits are elliptic' in terms of the concrete pair associated with the given planet. So the forms of the orbits of two distinct planets around the same star represent different instances of a unique abstract pattern. Also, it is often the case that by investigating the features of a given planet, one can infer properties of its classifying star, and that these properties can in turn be 'reflected back' into properties of another planet revolving around the same star. For example, the third Kepler's law asserts that the ratio of the square of the orbital period of a planet by the cube of the semi-major axis of its orbit is a constant that is characteristic of the star and does not depend on the given planet. This principle can thus be regarded as an invariant property of stars (or, more generally, of bodies around which other bodies revolve), and the concrete trajectories made by the planets can be interpreted as different manifestations of this abstract property in the context of the distinct (pairs associated with the) planets. The common classifying star can thus be used as a 'bridge' to transfer information between the two planets; indeed, investigation of the concrete trajectory of a planet can allow one to infer the characteristic constant of its classifying star, and this piece of information in turn determines the concrete trajectory of any other planet revolving around it.

### Linguistics: 'Bridges' for Translating

A fundamental feature of a translation is the set of abstract properties of texts (for example, the 'meaning,' the 'musicality,' 'structural' characteristics, etc.) which it leaves *invariant*.

A literal translation proceeds in a bottom-up or dictionary-oriented way, as it consists, broadly speaking, in splitting the given text into sentences and then into words or short expressions, replacing each word (or short expression) in the first language with a word (or short expression) in the other language that corresponds to it according to a given dictionary, and then assembling these words together 'from the bottom up,' following the same or at most a similar grammatical structure to that in which the corresponding words (or short expressions) were arranged in the original text. From this description, it is clear that what is preserved by this kind of translation is the syntactical structure of the sentences that make up the texts, but not necessarily the meaning or musicality of the texts, which is what one would naturally expect from a good translation. This is why automatic or literal translations are not always possible, and even when they are, are often rather unsatisfactory, especially when they occur between languages that have radically different syntactical ways of expressing a given meaning.

This naturally raises the following question: what type of approach should one adopt to obtain a good translation? Unlike a literal translation, a good translation should proceed in a top-down or invariant-oriented way, starting with the identification of a set of abstract properties of texts that one would like to preserve in the translation, and then using any such property  $P$  (or the 'intersection' of all such properties) as a 'bridge' for translating between the two languages, as follows. For each such  $P$  one looks at the way  $P$  is best expressed in the first language, and then at the way  $P$  can be best conveyed in the second language; the resulting expressions are then set to correspond to each other in the translation.

Note that in a translation of this kind, it is not necessarily the syntactical structure that must be preserved, as in the case of a literal translation, but rather the properties defined at the beginning as the chosen invariants. While a literal translation is neither particularly interesting nor conceptually profound, in that it essentially consists in a re-naming or re-labeling of the primitive constituents of a text according to a dictionary, a good literary translation is often a work of art which may reveal new aspects of a text that were, in a sense, 'hidden' in the original version, allowing new and different interpretations of the message.

### Genetics: DNA as a 'Bridge'

(Human) DNA embodies many of the essential features of the individual to which it belongs, but is invariant with respect to contingent features of the individual, such as its particular physical appearance at a given time (or its age).

DNA is determined essentially solely by the individual but it can be extracted from him/her in many different ways (for example, from different parts of the body). Many specific features of individuals are reflected in particular features of their DNA.

This makes the DNA a particularly suitable object for acting as a 'bridge' for transferring information across different individuals. For instance, the discovery of similarities between the DNA of different individuals may reveal parental relationships between them or similar predispositions to certain diseases.

Notice that the kind of insight that the investigation of DNA can provide cannot be obtained with alternative methods: indeed, only by using this level of analysis can one unveil the 'hidden' features of individuals encoded within the DNA.

This is similar to what happens in Topos Theory: the notion of a classifying topos of a theory plays the role of a sort of DNA of the theory, the investigation of which can reveal aspects of the theory that are barely visible with other techniques. As in Genetics one studies how modifications of the DNA influence the characteristics of an individual, so in Topos Theory one can study the effect that topos-theoretic operations on toposes have on the theories classified by them.

Ideal = Real?

Bridges abound both in Mathematics and in other scientific fields, and can be considered 'responsible' (at least abstractly) for the 'genesis' of things and the nature of reality as we perceive it. The idea of the bridge is an abstraction, but, interestingly, bridges arising in the experimental sciences can often be identified with actual physical objects. In fact, the most enlightening situations occur when these *ideal* objects admit *concrete* representations, allowing us to contemplate the dynamics of 'differentiation from the unity' in all its aspects.

Grothendieck toposes allow us to *materialize* a tremendous number of ideal objects, and hence to establish effective bridges between a great variety of different contexts. In general, looking for 'concrete' representations of 'imaginary concepts' can lead to the discovery of more 'symmetric' environments in which phenomena can be described in natural and unified ways.

### **Toposes as 'Bridges'**

Now that we have extracted the essential conceptual features of the 'bridge' technique, we can proceed to illustrating its implementation in the context of topos theory.

## The General Methodology

The theory of topos-theoretic 'bridges' is centered around the concept of Grothendieck topos.<sup>3</sup> The theory of Grothendieck topos is written in categorical language, but, unlike Category Theory, it is much more expressive, due to an additional degree of freedom implicit in the definition of topos. Indeed, a category can be thought of as a pair of sets related by some structure satisfying certain properties; any set can be regarded as a category, but most of the categories arising in Mathematics are not of this form. In fact, the concept of category has, with respect to the notion of set, an additional degree of freedom.

Toposes are mathematical objects which are built from a pair, called a site, consisting of a category  $C$  and a generalized notion of covering  $J$  on it in a certain canonical way (called Grothendieck topology). The process that produces a topos from a given site can be described as a sort of 'completion' with respect to certain categorical operations relative to which the category  $C$  might not be closed. Formally, a topos is defined as a category  $Sh(C, J)$  of sheaves on a site  $(C, J)$ .

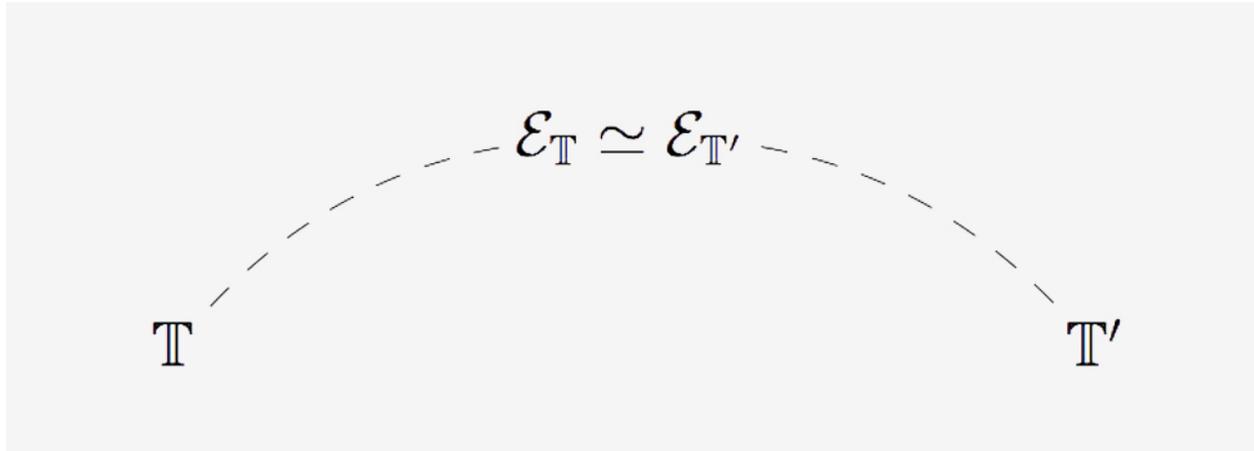
Different coverings can be considered on a given category, generally leading to inequivalent toposes; this gives the notion of topos one more degree of freedom with respect to that of category. The existence of these three 'degrees of freedom' implicit in the concept of a topos (two for the notion of category and one for that of Grothendieck topology) can be exploited to build 'mathematical universes' in which mathematical theories find their natural home and can be effectively compared with each other.

In fact, thanks to the pioneering work of Makkai and Reyes in the seventies,<sup>4</sup> to any mathematical theory  $T$  (of a general specified form, technically speaking a *geometric theory*) one can canonically associate a topos  $ET$ , called the *classifying topos* of  $T$ , which represents the natural framework in which the theory should be investigated, both in itself and in relationship to other theories. Two theories having the same classifying toposes (up to equivalence) are said to be *Morita-equivalent*.

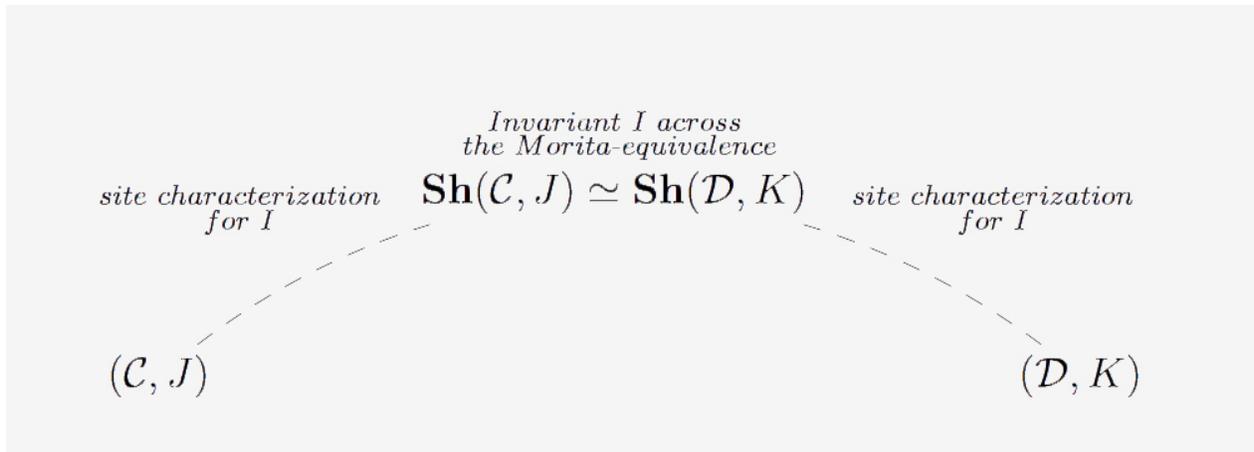
The existence of theories that are Morita-equivalent to each other translates, at the level of sites, into the existence of different sites generating the same topos (up to equivalence); indeed, to any theory one can canonically associate a site such that the topos built from it can be identified with its classifying topos.

The classifying topos of a theory can be effectively used as a 'bridge' to transfer information between the theory and any other theory that is Morita-equivalent to it, as follows. For any given property or construction of toposes which is *invariant* under equivalence of toposes (one requires this invariance because the classifying topos is

determined only up to equivalence), one tries to express it first in terms of one theory and then in terms of the other; provided that one obtains appropriate characterizations connecting properties of theories and properties of their classifying toposes (equivalently, characterizations connecting properties of sites and properties of toposes). This will lead to a logical relationship between properties of the two theories written in their respective languages:



Technically, the transfer of information across the two theories is realized by attaching to the two theories suitable sites of definition for their classifying topos (or objects of a different kind representing their classifying topos), and expressing topos-theoretic invariants on the given classifying topos in terms of these two sites by means of 'site characterizations':



A striking aspect of this technique, in addition to its level of generality (indeed, it can be applied to mathematical theories belonging essentially to any mathematical field), is the fact that it can be automated in many cases. Indeed, using the methods of Topos Theory one can obtain characterizations of the above kind for several invariants, holding

uniformly for any theory or at least for wide classes of theories (and for certain classes of invariants such characterizations can even be established in a purely mechanical way); in the presence of a Morita-equivalence, these characterizations will thus be able to act as the 'arches' of a 'bridge' connecting the two theories, making it possible to transfer information between them.

As is naturally expected, the translations between properties of Morita-equivalent theories realized by means of the 'bridge' technique can be very surprising. Indeed, a unique abstract invariant property defined at the topos-theoretic level may be expressed in completely different ways in terms of different sites of definition of a given topos. As an example, consider the property of *completeness* of a theory: a geometric theory is said to be *complete* if every geometric assertion written over its language is either provably true or provably false in the theory. Proving that a theory is complete is generally a difficult matter. Nonetheless, this property is equivalent to a simple invariant property of the classifying topos (namely, its property of being two-valued), admitting alternative reformulations in terms of other sites of definition. For instance,<sup>5</sup> this invariant property is equivalent to the *joint embedding property* on a category  $C$  (i.e., the property that any two objects in the category can be mapped to a third one) in the case of a non-trivial atomic site  $(Cop, Jat)$  (keeping in mind that the atomic topology  $Jat$  on the dual of a category  $C$  satisfying the amalgamation property is the Grothendieck topology having as covering sieves precisely the non-empty ones). Notice that the joint embedding property on a category is generally a much simpler way to verify a property than proving completeness of a theory; nonetheless, for theories  $T$  whose classifying topos is a topos of sheaves on an atomic site  $(Cop, Jat)$ , the two properties (i.e., completeness of  $T$  and joint embedding property of  $C$ ) correspond to each other under a topos-theoretic 'bridge,' which thus allows one to be established by verifying the other.<sup>6</sup>

### Why Toposes?

One might wonder what makes Grothendieck toposes so effective in serving as 'bridges' for connecting different mathematical theories with each other. There are several reasons for this, which we can summarize as follows:

- . *Generality*: Unlike most of the invariants used in Mathematics, the level of generality of topos-theoretic invariants is such that they are suitable for comparing (first-order) mathematical theories of essentially any kind.
- . *Expressivity*: Many important invariants arising in Mathematics can be expressed as topos-theoretic invariants.

. *Centrality*: The fact that topos-theoretic invariants often specialize to important properties or constructions of natural mathematical or logical interest is a clear indication of the centrality of these concepts in Mathematics. In fact, whatever happens at the level of toposes has 'uniform' ramifications in Mathematics as a whole.

. *Technical flexibility*: Toposes are mathematical universes that are very rich in terms of internal structure; moreover, they have a very well-behaved representation theory, which makes them extremely effective computationally when considered to be 'bridges.'

More information on the theory of topos-theoretic 'bridges' and Olivia Caramello's research can be found at [www.oliviacaramello.com](http://www.oliviacaramello.com) (<http://www.oliviacaramello.com>)

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## Footnotes

1. Those notions were introduced in Olivia Caramello. "The unification of Mathematics via Topos Theory." *arXiv:math*, June 2010. 42. Web. And further developed in Olivia Caramello. "Topos-theoretic background." IHES, September 2014. Web.
2. This can be acquired for instance by reading the first sections of Olivia Caramello. "Topos-theoretic background." *IHES September, 2014*. Web.
3. Michael Artin, Alexander Grothendieck and Jean-Louis Verdier, eds. "Séminaire de Géométrie Algébrique du Bois Marie (1963-64). Théorie des topos et cohomologie étale des schemas." *Lecture Notes in Mathematics* 2. Berlin, New York: Springer-Verlag, 1972. iv, 418. Print.
4. Michael Makkai and Gonzalo E. Reyes. "First-Order Categorical Logic." *Lecture Notes in Mathematics* 611. Berlin, Heidelberg: Springer-Verlag, 1977. 301. Print.
5. Olivia Caramello. "Fraïssé's construction fro of  $\simeq$ -equivalence classes. m a topos-theoretic perspective." *Logica Universalis* 8 (2). Berlin, Heidelberg: Springer Verlag, 2014. 261-281. Print.
6. Olivia Caramello. "The unification of Mathematics via Topos Theory." *arXiv:math*, June 2010. 42. Web. And "Topos-theoretic background." *IHES*, September 2014. Web.

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## The Forgotten Meta-Realities of Modernism: Die Uebersinnliche Welt and the International Cultures of Science and Occultism

Linda Henderson

Richard Sheppard, writing in his otherwise excellent essay “The Problematics of European Modernism” in 1993, posited a “meta-world which was not describable in Newtonian terms” as central to modernists’ conceptions of reality<sup>1</sup>. Although Sheppard does include a few references to science before 1920, such as the Futurist F. T. Marinetti’s interest in Brownian movement, the scientists he cites are Einstein and the quantum physicists Louis de Broglie, Erwin Schrödinger, and Paul Dirac, whose works had their cultural impact only in the 1920s and beyond. This view has been very common in discussions of modernism’s scientific context, beginning in the 1940s, when the myth of a connection between Cubism and Relativity Theory arose, and continuing through much of the century<sup>2</sup>. Even as questions were raised about the timing of Einstein’s major public impact, which occurred only after the November 1919 announcement of an eclipse expedition’s confirmation of one of his postulates, there was nothing yet to fill this gap<sup>3</sup>. The late Victorian ether physics that actually dominated the layperson’s understanding of reality in this period, including the central concept of the ether of space, had itself been so totally eclipsed in cultural histories (and even in the history of science) that it was largely overlooked by scholars.

Yet the notion of an invisible “meta-world” or meta-reality suggested by Sheppard was correct and absolutely central to the worldviews of educated laypersons, including artists, in this period. That new conception of reality emerged gradually as a result of a series of widely popularized scientific discoveries in the 1890s that pointed to the existence of a

range of invisible phenomena beyond the reach of human vision<sup>4</sup>. X-rays, discovered by Roentgen in 1895, made solid matter transparent and raised fundamental questions about the adequacy of the eye as a sensing instrument. Further challenges to the solidity of matter followed with Becquerel's discovery of radioactivity in 1896, J. J. Thomson's identification of the electron in 1897, and, especially, the subsequent work of the Curies and Ernest Rutherford on radioactivity. Popular science writers regularly suggested that all matter might be radioactive, offering the image of objects endlessly emitting particles into the surrounding ether, a view widely promulgated by French author Gustave Le Bon in bestselling books such as *L'Evolution de la matière* of 1905. At the same time, the prominent physicist Sir Oliver Lodge argued that the ether itself might be the source of matter in his "electric theory of matter," a concept cited by both Expressionist Wassily Kandinsky and Italian Futurist Umberto Boccioni in their writings<sup>5</sup>.

Together with X-rays, the development of wireless telegraphy in the later 1890s, based on Hertz's earlier confirmation of the existence of electromagnetic waves, focused attention on the ether of space as filled with waves vibrating at various frequencies beyond visible light, such as X-rays and Hertzian waves. Understood to suffuse all space without a gap in its "infinite continuity," as James Clerk Maxwell declared, the ether—in conjunction with radioactivity and the writings of Lodge, Le Bon, and others—offered a model of continuous cohesion and diffusion of matter<sup>6</sup>. And as additional functions for the ether were proposed by scientists in the later nineteenth century, the concept suggested great potential: "Ether vibrations have powers and attributes equal to any demand—even to the transmission of thought," Sir William Crookes declared in his 1898 British Association for the Advancement of Science Presidential Address<sup>7</sup>.



Figure 1: Die Uebersinnliche Welt (Berlin), vol. 8 (January 1900)

In recent years there has been a growing scholarly recognition of the continued centrality of the ether by certain historians of science as well as of art and of occultism<sup>8</sup>. Rather than Einstein, the prominent scientists known to the public in the early years of the century were figures such as the physicist Sir Oliver Lodge (the ether's great champion), the chemist Crookes, and the astronomer Camille Flammarion as well as radioactivity researchers Pierre and Marie Curie. Moreover, in this era the boundary between science and occultism generally acknowledged today was not at all clear cut. Lodge, Crookes, and Flammarion were all interested in various aspects of occultism, from spiritualism to telepathy, subjects of investigation for the Society for Psychical Research of which they and many other prominent figures, such as philosopher William James, were members. At the same time, occultists such as Madame Helena Blavatsky, cofounder of the Theosophical Society in 1875, along with her successors as representatives of the movement, Annie Besant and C. W. Leadbeater, closely followed contemporary developments in science, finding there support for their arguments against materialism.

Although Besant succeeded Blavatsky as president of the Theosophical Society in 1907, it was Leadbeater who mostly directly engaged the new developments in physics and wrote prolifically about them. The themes of the ether, vibration, and the popular notion of a higher fourth dimension of space featured prominently in his writings, such as *The Astral Plane* (1895) and *Clairvoyance* (1899), which were translated almost immediately into French and German<sup>9</sup>. Rudolf Steiner, who in 1902 became the head of the German branch of the Theosophical Society and in 1912 inspired the establishment of its Christian-oriented offshoot, Anthroposophy, likewise drew on the newest science for his system of “occult science.”<sup>10</sup>

The writings of Theosophists thus served as key vehicles for disseminating new scientific discoveries through the international network of Theosophical Society branches, which sponsored lectures, published journals, and encouraged book translations. We have been less aware, however, of the role that the equally prominent international network of spiritualist organizations and publications played in this promulgation of scientific ideas and occult responses to them. Just as the Theosophists drew on the new scientific discoveries, spiritualists likewise embraced in the X-ray’s demonstration of ranges of waves beyond sense perception that could be captured on a sensitive photographic plate (akin to spirit photography), the dematerialization of matter suggested by radioactivity, and the potential for materialization of forms from the ether<sup>11</sup>. This was an exhilarating moment for anyone interested in invisible phenomena, from occultists to laypersons encountering the ubiquitous discussions of the subject in popular scientific journals to artists who found themselves liberated from the focus on visible light and shade that had dominated the *métier* of painting for hundreds of years<sup>12</sup>.

In his 1994 book *Downcast Eyes: The Denigration of Vision in Twentieth-Century Thought*, historian Martin Jay quotes and extends T. J. Clark’s discussion of the later nineteenth-century painting of Paul Cézanne. According to Clark, “Doubts about vision became doubts about almost everything involved in the act of painting; and in time the uncertainty became a value in its own right: we could say it became an aesthetic.” Jay continues, “That aesthetic was what we call modernism, which is such movements as Cubism, Futurism, and Vorticism further explored Cézanne’s demolition of the received visual order.”<sup>13</sup> Yet, if Cézanne’s was largely an individual painter’s pursuit, artists from the 1890s through the 1910s had increasing stimulation from their cultural milieu to distrust sight and to seek to represent in some way reality beyond vision. Just as Jonathan

Crary in his *Techniques of the Observer* (1990) has argued for an episteme of “normative vision” in the nineteenth century, we should recognize an episteme of “non-vision” in the later nineteenth and early twentieth century that focused on invisible meta-realities<sup>14</sup>. In 2002 I introduced the term “vibratory modernism” to describe this overlooked aspect of modernism so evident in the writings and images of many modern artists. Yet, at that time, it was not clear how this shared culture was established internationally, apart from popular science writing. How was it, for example, that both Kandinsky in Munich and Boccioni in Milan cite the electric theory of matter as a central support for their new styles? Now, however, it can be demonstrated that there was an international culture of occultism as well as of science, which readily transcended national borders. Like the internet today, these ideas travelled rapidly on networks formed by monthly occult journals reporting on developments from all over Europe and America and even further destinations (India, particularly, for the Theosophists).

The remainder of this essay focuses on an example of that kind of cross-cultural diffusion of information, both scientific and occult—in this case, the monthly German spiritualist periodical *Die Uebersinnliche Welt*, published in Berlin from 1893 to 1922<sup>15</sup>. The journal’s title declared its particular focus—the world beyond the senses, making it a timely index of the preoccupation with the invisible discussed above. Although the journal featured a more conventional, Egyptian-themed cover design for the years 1898-1901 and 1906-1913 (Figure 1), the remarkable cover for the years 1902-1905 (Figure 2) gives striking visual form to the invisible vibratory energies that were the focus of so much of the writing in the journal by this time<sup>16</sup>. The cover design by the prominent painter and graphic artist Fidus (Hugo Höppener) features a simplified landscape centered on the sun emitting radiations and clouds filled with signs of pulsating energy. Framed by an ouroboros, which had been subtly present at the center bottom of the earlier cover illustration, the central image points up the abstract potential invisible vibrations could suggest to artists—from the painter Edvard Munch in Berlin in the mid-1890s in a spiritualist-oriented circle to Kandinsky, whose archive contains several issues of the journal<sup>17</sup>.

Both the ouroboros and the six-pointed star above it were also elements of the emblem of the Theosophical Society, and the designer Fidus was himself a Theosophist, so the cover effectively registers the complexity of German occultism at this moment. The Berlin spiritualist organization that published the journal, the Wissenschaftlichen Vereinigung “Sphinx,” would increasingly seek to distinguish their approach from that of Theosophy by the years 1904-1905, as we shall see. The return of the earlier cover in 1906

restored the five-pointed star and the topic of Theosophy virtually disappeared from the journal's pages, even though the name of the London Theosophical Publishing Society, first listed in 1901 as a collaborator, continued to appear on the cover through summer 1914<sup>18</sup>. In the 1890s and early years of the century, however, the two groups' shared an interest in the newest science made certain Theosophical writings useful for their purposes.

Historian Corinna Treitel in her 2004 book *A Science for the Soul: Occultism and the Genesis of the German Modern* provides a superb study of the role of occultism in all its varieties in German culture in the late nineteenth and early twentieth centuries. As she explains,

*Occultists saw themselves as part of a counterculture, locked in battle against a dominant materialist tendency of the age, and this self-understanding gave their movement its dynamism and appeal. They aspired to use occult phenomena to establish new truths about the human soul and the world it inhabited, to construct on this basis a new worldview that would make materialism obsolete.*<sup>19</sup>

Treitel also discusses the situation in which spiritualists found themselves—not only in competition with Theosophy but also challenged by the rising field of experimental psychology and differing positions within that developing field.

Carl du Prel, the influential, Munich-based author of *Die Philosophie der Mystik* of 1885 and a committed spiritualist by 1880, was a key inspiration for the founders of *Die Uebersinnliche Welt*, and his writings figured prominently in its issues<sup>20</sup>. Du Prel had developed a form of “transcendental psychology,” which argued for the existence of a “transcendental subject” independent of the physical body and for a moving “threshold of sensibility” that would increasingly open up realms previously inaccessible to human consciousness.<sup>21</sup> Following Treitel, Heather Wolfram and Andreas Sommer have tracked the split in the early 1890s within the German psychological community between du Prel's faction and that of his colleagues who were increasingly focused on experimental forms of psychical research, including hypnotism<sup>22</sup>. Wolfram chronicles the 1889 departure of du Prel and his followers from the Psychologische Gesellschaft in Munich and quotes the 1891 statement published in the journal *Sphinx* by the remaining researchers, including Albert Schrenk-Notzing, who had joined their Berlin counterparts in the Gesellschaft für Psychologische Forschung:

*The group of scholars who branched off [i.e., Du Prel and others—LDH] emphasize more the transcendental-psychological phenomena of the abnormal mental life in the real sense (that is spiritualism, examination of Od and related areas) and go their own way undisturbed. The Psychologische Gesellschaft, however, stands on the positive ground of normal psychology and seeks in close connection with official science to expand the inductive method to anormal psychological phenomena.*<sup>23</sup>

Du Prel and his colleagues formed the Gesellschaft für Wissenschaftliche Psychologie, and, although he died in 1899, *Die Uebersinnliche Welt* in 1901 added to the cover page that Munich group as cosponsor and foregrounded the subtitle of the journal as “Monatsschrift für Okkultistische Forschung” [Monthly for Occult Research], emphasizing its research orientation. The journal’s goal, like du Prel’s was a *wissenschaftlich* (scientific) occultism. In contrast to the experimental psychologists, however, the science that interested them was not the “official science” of psychology cited above, but the newest physics that was revealing invisible realities and casting light on older concepts such as the “Od” or “Odic force” of Austrian Baron Karl von Reichenbach. In the mid-nineteenth century Reichenbach had connected his “Od” to the fluid of animal magnetism, and the concept remained of considerable interest in the later years of the century in the context of ether and electromagnetism, including in the work of occultists Albert de Rochas and Hippolyte Baraduc in Paris<sup>24</sup>. As du Prel had declared in 1893, “Occultism is only unknown science. It will be proven through the science of the future.”<sup>25</sup>

Although Theosophists and spiritualists differed on what occurred during a séance—spiritualists believed that a medium communicated with actual spirits who were present, while Theosophists understood the medium to be accessing a higher level of the self that made information accessible—they were equally interested in the justification the new developments in science could provide for their ideas. Both groups drew on the work of Lodge, Crookes, and Flammarion, along with myriad others such as Baraduc, who was carrying out experiments in Paris in the photography of thought and emotion via ether vibrations. Indeed, the “transcendental photography” of Baraduc and others, such as Commandant Darget with his “V Rays,” was a prominent theme in *Die Uebersinnliche Welt* and was of particular interest to Kandinsky<sup>26</sup>. Besant and Leadbeater specifically cited Baraduc as their scientific counterpart in presenting patterns of thought in their 1905 book *Thought-Forms* and drew directly on Lodge’s latest ideas on the ether in the appendix to their 1908 *Occult Chemistry*<sup>27</sup>. Beginning in the 1890s, the editors of *Die Uebersinnliche Welt* reproduced major lectures of and letters by Lodge and Crookes as well as the writings of Flammarion, among many others.

While Theosophists had the ubiquitous books on their doctrines being produced by the leaders of the organization, spiritualists were far more dependent on confirmations to be found in successful demonstrations of the powers of spirit mediums as well as the contemporary science that might help explain the phenomena. Texts by figures like du Prel and others appeared regularly in *Die Uebersinnliche Welt*, but crucial to the journal's *wissenschaftlich* spiritualism were the international reports of the latest séance phenomena not only in Germany but especially in Paris, London, and Milan, as well as outside Europe. Here is where the journal actually functioned as an internet-like communications network before the fact. An event occurring at a séance in Milan, for example, would be reported immediately in the following month's issue. Multilingual associates of the journal scoured international spiritualist publications and then translated relevant texts for the journal's readers. (The international "Adresse Almanach" compiled by editor Max Rahn in the later-1890s issues documents the hundred-plus spiritualist organizations around the world at the turn-of-the-century.) The Berlin group was particularly close to occultists in Paris and regularly translated articles from the *Annales des sciences psychiques* by sympathetic researchers such as Julian Ochorowicz or Rochas, who had actually cited Lodge's work on electromagnetism in one of the appendices to his *Extériorisation de la sensibilité* of 1895<sup>28</sup>. Both Rochas and Lodge, along with many other prominent scientists, such as French physiologist Charles Richet and Italian criminologist Cesare Lombroso, had participated in séances with the medium Eusapia Palladino, whose varying fortunes *Die Uebersinnliche Welt* followed closely<sup>29</sup>. For the early years of the journal, through the period of its theosophically oriented Fidus cover (1902-1905), writings by Theosophists offered highly accessible responses to the implications of the latest scientific discoveries, such as the X-ray. Indeed, the two groups at that point were not mutually exclusive, and the journal published a series of articles by its own H. Strebels, "Kraft und Stoff in 'Astralen,'" during 1899 and 1900, with extensive discussion of Od and ether vibrations on the astral plane<sup>30</sup>. Strebels himself was drawing in part on the writings of Leadbeater, whose *The Astral Plane: Its Scene, Inhabitants and Phenomena* (1895) had appeared in German in 1896. The discovery of the X-ray gave Leadbeater as well as the spiritualists a new touchstone to argue for the limited nature of perception on the physical plane<sup>30</sup>. In its August and September 1903 issues *Die Uebersinnliche Welt* published a summary of Leadbeater's 1901 Chicago lecture on "The Unseen World," which had appeared in that city's spiritualist newspaper *The Progressive*

*Thinker* and then in *The Theosophist*<sup>31</sup>. An editorial note explained that while the journal did not agree with Leadbeater's Theosophical views, the editors believed that the lecture raised important issues from contemporary science relevant to their readers.

The Chicago and Berlin editors were apologizing for the specific Theosophical content in Leadbeater's text—particularly this argument for the higher and successively refined planes of existence Theosophists posited as continuous with the physical world. These included the astral and mental planes, with “etheric matter” as the first step (still on the physical plane) toward the “finer subdivisions of matter,” including a Heaven-World he identified with the mental plane<sup>32</sup>. Although Leadbeater presented the ether as a “state of matter beyond solid, liquid, and gas” and a step toward the astral plane, his language in fact paralleled contemporary discussions in physics, so that many of his ideas would have seemed somewhat familiar to his listeners. “We never see the ether which carries the vibrations of light though we may demonstrate its necessity as a hypothesis to explain what we find,” he asserts<sup>33</sup>. Or, “All sensation is a matter of vibration” and “the whole secret of the Roentgen rays, or the X-ray [,] is simply bringing within the capacity of your eye ... a few more rays, a few of the finer rates of vibration ....”<sup>34</sup> According to Leadbeater, while these finer vibrations escape most people, there are objects around us that “do reflect these other rates of vibration which we do not see” and “some of such things can be photographed.”<sup>35</sup> To illustrate that point he discusses Baraduc, recounting his personal experience of his work “when I was last there” and asserting that the Frenchman had “experimented in a regular scientific way” and had “succeeded in photographing the invisible.”<sup>36</sup> Continuing his focus on the invisible, Leadbeater explains, “The etheric sight ... is simply an added power of responding to vibrations in the same manner as the Roentgen ray scheme; and you will find that much of the clairvoyance on a small scale, which is done by spirits at séances is just exactly that type.”<sup>37</sup>

For the spiritualists at *Die Uebersinnliche Welt*, who laid claim to a scientific approach, Leadbeater's arguments for Theosophy's validity at the end of his lecture would have been troubling. Could Theosophy really be, as he asserted, absolutely “scientific,” the “apotheosis of common sense,” and the “Wisdom-Religion of all time”<sup>38</sup>? Indeed, when the second installation of Leadbeater's text appeared the next month, September 1903, it was preceded by an article by Dr. Franz Freudenberg, a regular contributor, titled “Ein interessantes Kapitel aus Flammarion's 'L'Inconnu.’” Introduced by Freudenberg, the excerpt from Flammarion's *L'Inconnu* included the “table of vibrations” Crookes had first set forth in his Presidential Address before the Society for Psychical Research in 1897 in

an argument about the relativity of knowledge<sup>39</sup>. This was a rudimentary form of the developing electromagnetic spectrum (with sound vibrations incorporated), emphasizing the “Unknown” ranges inserted between the then-identified X-rays, “Light” (“luminous rays, caloric and chemical rays, spectra of the infra-red to the ultra-violet spectrum”), and “Electricity,” which was widely reproduced in English-language literature in this period as well as in the *Revue Scientifique*<sup>40</sup>. Crookes’s table of vibrations had clearly been a source for Leadbeater, and the inclusion of the excerpt from the spiritualist Flammarion made clear that non-Theosophists had also drawn important conclusions from it. Crookes himself was a crucial touchstone for the journal, and in July 1903—even before the Leadbeater articles appeared—prominent contributor Professor Karl Obertimpfler had reported on “Sir William Crookes in Berlin.” Crookes was in the city for an international chemistry congress, and Obertimpfler recounts his personal meeting with Crookes who gave there his lecture “Modern Views of Matter.”<sup>41</sup> Obertimpfler summarized aspects of Crookes’s talk on the newest ideas about the nature of matter, including Thomson’s identification of the electron and the current research by the Curies. This was a critical moment for the journal’s future, because the popularization of radioactivity would provide spiritualists new scientific sources that would take them into territory clearly separate from Theosophy. For Theosophists, the understanding of the atom would still be dominated by Besant and Leadbeater’s clairvoyant “Occult Chemistry,” on which they had begun to publish in 1895 and which they would publish in book form in 1908<sup>42</sup>. Although the *Die Uebersinnliche Welt* cover design would remain the same through 1905, the journal’s discussion of the newest aspects of physics and chemistry would become increasingly prominent. In his subsequent new year’s essay, “Zum Jahreswechsel 1904,” Obertimpfler would celebrate the newest developments in radium research, including its transformation into helium in the work of William Ramsay and the implications of this “transmutation” for spiritualists. “Occultism is the father of the science of the future,” he concluded, just as du Prel had asserted, “Occultism is only unknown science” that “will be proven through the science of the future.”<sup>43</sup> In his “Zum Jahreswechsel 1905” text a year later, Obertimpfler concluded confidently, “Ours is the future!”<sup>44</sup>



Figure 2: Die Uebersinnliche Welt (Berlin), vol. 10 (January 1902). Design by Fidus (Hugo Höpperner)

In July 1904 *Die Uebersinnliche Welt* began publishing articles focused specifically on science by a new contributor, Robert Blum, and the journal now truly became a source of current scientific information with bearing on the case for the validity of spiritualism. Typically, the ether and the names of figures like Lodge and Crookes remained prominent, at the same time that new figures such as the Frenchman Le Bon became relevant to the spiritualist interest in themes such as materialization and dematerialization<sup>45</sup>. In 1906 Blum published a book drawing on his writing for the journal on science and occultism, which he titled, somewhat curiously, *The Fourth Dimension*. Even though the book had little to do with that subject specifically, it was a term strongly associated with spiritualism because of the activities of Leipzig astronomer J.C.F. Zöllner and the medium Henry Slade in the 1870s<sup>46</sup>. Most interestingly, however, is the second section of Blum's three-part book, titled "Die Irrtümer moderner Theosophie" [The Errors of Modern Theosophy]<sup>47</sup>. This was the same year *Die Uebersinnliche Welt* reverted to its earlier cover design, despite the fact that Fidus's

imagery suggested so effectively the very energies that were now even more central to the journal's scientific interests. The tolerance for Theosophy was gone, and the names of Theosophists would subsequently appear only occasionally in the announcements of newly published books.

Seven issues of *Die Uebersinnliche Welt* from 1904, 1906, and 1908 are preserved in the Kandinsky-Gabriele Münter library at the Lenbachhaus in Munich, along with a number of other spiritualist sources in addition to his other books. One of these issues (January 1908) features an article on the “transcendental photography” that so interested the artist, including the work of Baraduc and Darget<sup>48</sup>. Commandant Darget, whose book on photographing “V-rays” Kandinsky acquired in its French edition, would work closely with the journal's editors in subsequent years, and they even published a German translation of his book<sup>49</sup>. It is a reminder that despite Kandinsky's growing allegiance to Rudolf Steiner, he was operating in a milieu in which various strands of occultism (some competing) intermingled<sup>50</sup>. In *On the Spiritual in Art*, published in late 1911, the artist notes “Dr. Steiner” and mentions Blavatsky briefly in his text (reflecting back on Theosophy), but he then lists in a footnote “Zöllner, Wagner, Butlerov, Crookes, Ch. Richet, C. Flammarion,” as well as “C. Lombroso,” all of whom were associated with both science and spiritualism<sup>51</sup>. Kandinsky was also interested in the work of Albert de Rochas, another close associate of *Die Uebersinnliche Welt*<sup>52</sup>. With his references to the “further division of the atom” and to the “electric theory of matter,” Kandinsky had clearly absorbed a variety of intellectual stimuli as he developed his artistic theory and pioneering style of abstract painting<sup>53</sup>. And based on spiritualism, Theosophy, and the thought transfer embodied “transcendental photography,” he had good reason to believe his paintings could set up vibrations in the soul of a viewer<sup>54</sup>.

Contemporary science, centered on ether physics, was the grounding on which both Theosophists and spiritualists were drawing heavily, and, as we have seen, occult journals like *Die Uebersinnliche Welt* served as critical vehicles for the international transmission of the newest scientific ideas and the varying occult responses to them. It is little wonder that the Futurist Boccioni—interested in spiritualism and, briefly, Theosophy in Italy—would share Kandinsky's scientific interests, including the “electric theory of matter”; journals such as *Ultra: Rivista Teosofica di Roma* were publishing much of the same type of content. This is true, too, of the situation in Paris, where an artist like Kupka (himself a spiritualist also interested in Theosophy) could read much of the same kind of information in the Parisian journal *La Vie Mystérieuse*, whose editorial board included associates of the Salon Cubist circle, poet Alexander Mercereau and publisher

Eugène Figuière<sup>55</sup>. With its Paris counterpart—first the *Librarie Spiritualiste* and then Hector Durville’s *Librairie du Magnétisme*—as well as its links to figures like Rochas and Darget as well as the *Annales des sciences psychiques*, *Die Uebersinnliche Welt* was closely connected to activities in Paris—a bond that only the coming of World War I could break. It is clearly time to explore this long forgotten underpinning of modernism in the international cultures of science and occultism and the stimulating focus on invisible meta-realities to which they gave rise.

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## Footnotes

1. Richard Sheppard. “The Problematics of European Modernism.” *Theorizing Modernism*. Ed. Steve Giles. London: Routledge, 1993. 14. Print.
2. See Linda Dalrymple Henderson. “Four-Dimensional Space or Space-Time?: The Emergence of the Cubism-Relativity Myth in New York in the 1940s.” *The Visual Mind II*. Ed. Michele Emmer. Cambridge: MIT Press, 2005. 349-97. Print. See also Henderson, *The Fourth Dimension and Non-Euclidean Geometry in Modern Art* (1983). Rev. ed. Cambridge, MA: The MIT Press, 2013. Appendix A. Print.
3. On Einstein’s theories and their reception, see, e.g., Helge Kragh. *Quantum Generations: A History of Physics in the Twentieth Century*. Princeton: Princeton University Press, 1999. 90-104. Print.
4. On these discoveries, see, e.g., L. D. Henderson, “Editor’s Introduction: I. Writing Modern Art and Science—An Overview; II. Cubism, Futurism, and Ether Physics in the Early Twentieth Century.” *Science in Context* 17 (Winter 2004): 423-66. Print.
5. See Sir Oliver Lodge. “Electric Theory of Matter.” *Harper’s Monthly Magazine* 109 (Aug. 1904): 383-89. Print. See also Kandinsky. “On the Spiritual in Art.” *Kandinsky: Complete Writings on Art*. Eds. Kenneth C. Lindsay and Peter Vergo. New York: Da Capo, 1994. 142. Print. And Umberto Boccioni. *Pittura scultura futurista (dinamismo plastico)*. Milan: Edizioni Futuriste di “Poesia,” 1914. 105. Print.
6. Maxwell, as quoted by Sir Oliver Lodge in *The Ether of Space*. New York and London: Harper & Brothers, 1909. 114. Print. On the history of the ether, see, e.g., G. N. Cantor and M. J. S. Hodge. *Conceptions of Ether: A Study in the History of Ether Theories 1740-1900*. Cambridge: Cambridge University Press, 1981.
7. “Address by Sir William Crookes, President.” *Report of the Sixty-Eighth Meeting of the British Association for the Advancement of Science* (1898). London: John Murray, 1899. 31. Print. Crookes’s text was reproduced in part in *Die Uebersinnliche Welt* 2 (Feb. 1899): 57-61. Print.
8. See, e.g., L. D. Henderson. “Vibratory Modernism: Boccioni, Kupka, and the Ether of Space.” *From Energy to Information: Representation in Science and Technology, Art, and Literature*. Eds. Henderson and Bruce Clarke. Stanford: Stanford University Press, 2002. 126-49. Print; Courtney Grean Raia. “From Ether Theory to Ether Theology: Oliver Lodge and the Physics of Immortality.”

*Journal of the History of the Behavioral Sciences* 43 (Winter 2007): 19-43. Print; Richard Noakes. "The 'World of the Infinitely Little': Connecting Physical and Psychical Realities Circa 1900." *Studies in the History and Philosophy of Science* 39 (2008): 323-34. Print; Egil Asprem. "Pondering Imponderables: Occultism in the Mirror of Late Classical Physics." *ARIES* 11/2 (2011): 129-65. Print; and Asprem. *The Problem of Disenchantment: Scientific Naturalism and Esoteric Discourse 1900-1939*. Leiden: Brill, 2014. Print.

9. For the interest in science by Blavatsky and other occultists, see Henderson. "Vibratory Modernism." Op. cit. On the popularization of interest in a possible fourth dimension of space via Leadbeater's writings, see Henderson. *Fourth Dimension and Non-Euclidean Geometry in Modern Art*. Op. cit. Chap. 1. Print.

10. On Steiner, see, e.g., Helmut Zander. *Rudolf Steiner: Die Biographie*. Munich: Piper, 2011. Print. Steiner was virtually ignored by the editors of *Die Uebersinnliche Welt* as he rose to prominence in the context of German occultism.

11. For some time, a number of German scholars have been actively exploring spiritualism and its cultural impact as part of an interest in media history and technology. Wolfgang Hagen's essay "Der Okkultismus des Avantgarde um 1900" [in *Konfigurationen: Zwischen Kunst und Medien*. Eds. Sigrid Schade and Georg Christoph Tholen. Munich: Fink, 1999. Print.] exemplifies this scholarship, as does Stefan Andriopoulos's book *Ghostly Apparitions: German Idealism, the Gothic Novel, and Optical Media* [New York: Zone Books, 2013. Print.]. Such authors find in spiritualism (and related occult concerns in France) a prototype for the emergence of the technology of telegraphy as well as an important stimulus for modernist creation. Corinna Treitel's book *A Science for the Soul: Occultism and the Genesis of the German Modern* [Baltimore: Johns Hopkins Press, 2004. Print.] is the first book-length study in English of the important role of occultism, including spiritualism, in the emergence of modern culture in Germany in the late nineteenth and early twentieth centuries. On spiritualism and Anglo-American modern literature, see Tim Armstrong. *Modernism: A Cultural History*. Cambridge: Polity Press, 2005. Chap. 6: "The Vibrating World: Science, Spiritualism, Technology." Print.

12. The vast amount of popular literature on these subjects can be sampled readily through periodical indices such as *The Reader's Guide to Periodical Literature* (now digitized); for a sampling of this literature in France, see, e.g., the bibliography by topic in L. D. Henderson. *Duchamp in Context: Science and Technology in the Large Glass and Related Works*. Princeton: Princeton University Press. 1998. Print.

13. See Martin Jay. *Downcast Eyes: The Denigration of Vision in Twentieth-Century Thought*. Berkeley: University of California Press, 1994. 159. Print.

14. See Jonathan Crary. *Techniques of the Observer: On Vision and Modernity*. Cambridge: The MIT Press, 1990. 16. Print, where he builds on the theories of Michel Foucault.

15. The founding editor in of *Die Uebersinnliche Welt* [henceforth, DUW] in 1893 was Max Rahn. Ulrich Linse describes the journal as "one of the highest quality German publications," in a brief discussion in "Der Spiritismus in Deutschland um 1900." *Mystique, mysticisme et modernité en Allemagne autour de 1900*. Strasbourg: Presses Universitaires de Strasbourg, 1998. 101. Print.

16. With the outbreak of war in August 1914, the journal changed to German script and never returned to its original cover after the war. For a group so international in its orientation and so close to their French associates, the war was a wrenching shock.
17. On the artist Fidus, see, e.g., Janos Frecot, Johann Freidrich Geist, and Diethart Kerbs. *Fidus, 1868-1948: Zur ästhetischen Praxis bürgerlicher Fluchtbewegunen*. Munich: Rogner & Bernhard, 1972. Print. On Munch, spiritualism, and the new science, see, e.g., Pascal Rousseau. "Radiation: Metabolising the 'new rays.'" *Edvard Munch: The Modern Eye*. Exh. cat. London: Tate Publishing, 2012. 160-69. Print. For Kandinsky's issues, see note 48 below.
18. Theosophists' names would appear only occasionally in the book review section of the journal. From 1902 to 1905, while the cover bore the six-pointed star design by Fidus, the group maintained a line drawing of a sphinx in profile against a five-pointed star (introduced in 1893) at the top of the initial page of text in each issue.
19. Treitel. *Op. cit.* 16
20. On du Prel, see Thomas P. Weber. "Carl du Prel (1839-1899): Explorer of Dreams, the Soul, and the Cosmos." *Studies in the History and Philosophy of Science* 38 (2007): 593-604. Print. Weber cites an August 1880 letter from du Prel to J.C.F. Zöllner, documenting his having become a spiritualist (597).
21. See Carl du Prel. *The Philosophy of Mysticism*. Trans. C. C. Massey. London: George Redway, 1889. Vol. 2. 130-65: "The Transcendental Subject." Print. For moving "threshold of sensibility," see 129ff. In his chapter on "Psychic Television," Andriopoulos includes a discussion of du Prel's interest in "television" in relation to wave-borne thought transfer; see Chap. 5: "Ghostly Apparitions."
22. See Treitel. *Op. cit.* Chap. 2; Wolfram. *The Stepchildren: Psychological Research and Parapsychology in Germany, c. 1870-1939*. Amsterdam: Rodopi, 2009. Print; and Andreas Sommer. "Normalizing the Supernormal: The Formation of the 'Gesellschaft für Psychologische Forschung' ('Society for Psychological Research'), c. 1886-1890." *Journal of the History of the History of the Behavioral Sciences* 49 (Winter 2013): 18-44: Print.
23. M. Offner. "Die deutsche Gesellschaft für psychologische Forschung." *Sphinx* 18/66 (1891): 334 (1). Print. Quoted in Wolfram. *Op. cit.* 70. Although du Prel had been closely involved with the journal *Sphinx* from its founding in 1886, it increasingly focused on empirical psychical research (Sommer, "Normalizing the Supernormal"); ultimately, however, in 1892 editor Wilhelm Hübbe-Schleiden, a Theosophist, redirected the journal's focus to Theosophy.
24. On Reichenbach, Rochas, and Baraduc, see, e.g., Rolf. H. Krauss. *Beyond Light and Shadow: The Role of Photography in Certain Paranormal Phenomena: An Historical Survey*. Trans. Timothy Bell and John Gledhill. Munich: Nazraeli Press, 1995. Print. Krauss also addresses the thought photographer Louis Darget (discussed further below). On Rochas and Baraduc, see Henderson. "Vibratory Modernism." *Op. cit.*
25. Carl du Prel. *Spiritismus*. Leipzig: P. Reclam, 1893. 15. Print. Quoted in Eberhard Bauer. "Spiritismus und Okkultismus." *Okkultismus und Avant-garde: Von Munch bis Mondrian 1900-1915*. Ed. Veit Loers. Exh. cat. Frankfurt: Schirn Kunsthalle, 1996. 60. Print.

26. On Darget, see the sources cited in note 24 as well as the discussion of Kandinsky's interest in Baraduc and Darget in note 48.

27. See Annie Besant and C. W. Leadbeater. *Thought-Forms*. London: Theosophical Publishing Society, 1905. 12-14. Print; and Besant and Leadbeater. *Occult Chemistry: A Series of Clairvoyant Observations on the Chemical Elements*. London: Theosophical Publishing Society, 1908. Appendix: "The Aether of Space." Print.

28. See Henderson. "Vibratory Modernism." Op. cit. 141.

29. See, e.g., "Prof. Oliver Lodge's Bericht über Eusapia Paladino [sic]." *DUW* 3/3 (March 1895): 45-50. Print. On Lodge and Eusapia, see Richard Noakes. "Haunted Thoughts of the Careful Experimentalist: Psychical Research and the Troubles of Experimental Physics." *Studies in History and Philosophy of Biological and Biomedical Sciences* 48 (2014): 46-56. Print.

30. H. Strebel's "Kraft und Stoff in 'Astralen'" appeared monthly in the issues for March-May 1899 (vol. 7, nos. 3-5) and for March-September and then December 1900 (vol. 8, nos. 3-8/9 and 12). Print. Strebel's commitment to Theosophy was clear in his intervening two-part article "Ein Lanze für indische Psychologie under Theosophie." *DUW*, 8/10 (Oct. 1900): 370-79; and 8/11 (Nov. 1900): 410-28. Print.

31. See "Die Welt, die wir nicht sehen" [excerpt by Gunther Wagner]. *DUW*, 9/8 (Aug. 1903): 315-20; and *DUW*, 9/9 (Sept. 1903): 336-40. Print. The citation provided in *DUW* is to C. W. Leadbeater. "The Unseen World." *The Theosophist* (Adyar, Madras) 22/8 (May 1901): 458-65; and 22/9 (June 1901): 520-27. Print. In the summary below, I provide page references to both sources, using Leadbeater's original English.

32. Leadbeater. "Unseen World." *Theosophist* 22/8 (May 1901): 462; 22/9 (June 1901): 524; and "Die Welt." *DUW* 9/8 (Aug. 1903): 318; 9/9 (Sept. 1903): 340. Print.

33. Leadbeater. "Unseen World." *Theosophist*, 22/8, 462; and "Die Welt." *DUW* 9/8. 318. Print.

34. For "all sensation," see Leadbeater. "Unseen World." *Theosophist* 22/8: 464; "Die Welt." *DUW* 9/8: 320; for "whole secret," see Leadbeater. "Unseen World." *Theosophist* 22/8: 465; "Die Welt." *DUW* 9/9: 336.

35. Leadbeater. "Unseen World." *Theosophist* 22/8: 465; "Die Welt." *DUW* 9/9: 336.

36. Leadbeater. "Unseen World." *Theosophist* 22/9: 520; "Die Welt." *DUW* 9/9: 336-37.

37. Leadbeater. "Unseen World." *Theosophist* 22/9: 521; "Die Welt." *DUW* 9/9: 337.

38. Leadbeater. "Unseen World." *Theosophist* 22/9: 527; "Die Welt." *DUW* 9/9: 340.

39. See "Ein Interessantes Kapitel aus Flammarion's 'L'Inconnu'" [reported by Dr. Franz Freudenberg]. *DUW* 9/9 (Sept. 1903): 330-36. Print. See Camille Flammarion. *The Unknown*. New York and London: Harper & Brothers, 1900. 12. Print. For Crookes's original lecture, see "Sir William Crookes on Psychical Research." *Annual Report of the Smithsonian Institution*, 1899. Washington, D. C.: Government Printing Office, 1901. 185-205. Print.

40. See William Crookes. "De la relativité des connaissances humaines." *Revue Scientifique* 4th ser. 7 (May 15, 1897): 609-13. Print.

41. See Prof. Carl Obertimpfler. "Sir William Crookes in Berlin." *DUW* 11/7 (July 1903): 269-73.

42. See note 27.

43. Prof. Carl Obertimpfler. "Zum Jahreswechsel 1904." *DUW* 12/1 (Jan. 1904): 3, 5. Print; for du Prel's statement, see note 25.
44. Prof. Carl Obertimpfler. Op. cit. 3.
45. See R.B. [Robert Blum]. "Grundgesetze des 'Okkultismus.'" *DUW* 12/7 (July 1904): 252-64. Print, in which Blum mentions Lodge and Crookes, along with Heinrich Hertz.
46. On Zöllner, see Treitel. Op. cit. Chap. 1; and Henderson. *Fourth Dimension and Non-Euclidean Geometry in Modern Art*. Op. cit. Chap. 1.
47. See Robert Blum. *Die Vierte Dimension*. Stuttgart: Verlag Altmann, 1906. Print.
48. See J. Peter. "Transcendental-Photographie." *DUW* 16/1 (Jan. 1908): 4-18. The library is held by the Gabriele Münter und Johannes Eichner Stiftung, which is located at the Lenbachhaus. Sixten Ringbom was the first scholar to discuss Kandinsky's interest in Baraduc, Darget, and Rochas, based on this archive; see Ringbom. *The Sounding Cosmos: A Study in the Spiritualism of Kandinsky and the Genesis of Abstract Painting*. Åbo, Åbo Akademi, 1970. 53-55. Print; on Rochas, see 122-23. On the photographers, see again note 24.
49. See Commandant Darget. *Exposé des différentes méthodes pour l'obtention de photographies fluïdo-magnétiques et spirites: rayons V (vitaux)*. Paris: Edition de l'Initiation, 1909. Print.
50. On Kandinsky's art and theory, see, e.g., L. D. Henderson. "Abstraction, the Ether, and the Fourth Dimension: Kandinsky, Mondrian, and Malevich in Context." *Kandinsky, Malewitsch, Mondrian: Der Weisse Abgrund Unendlichkeit/The Infinite White Abyss*. Eds. Marian Ackermann and Isabelle Malz. Exh. cat. Düsseldorf: Kunstsammlung Nordrhein-Westfalen, 2014. 37-55 (German). 233-44 (English). Print.
51. See Kandinsky. "On the Spiritual in Art." In *Complete Writings*. Eds. Lindsay and Vergo. Op. cit. 143, 45; Kandinsky also mentions Palladino in relation to Lombroso [143]. While Ringbom discussed the various figures in Kandinsky's list in *The Sounding Cosmos* [Op. cit. 50-52], he dismissed spiritualism as a relevant source for Kandinsky [56].
52. See Ringbom. Op. cit. 122-23.
53. See again note 5. See also Kandinsky. "Reminiscences/Three Pictures" (1913). In *Complete Writings*. Eds. Lindsay and Vergo. Op. cit. 364.
54. See, e.g., Kandinsky. "On the Spiritual in Art." In *Ibid.* 157-60.
55. On Boccioni and Kupka, see Henderson. "Vibratory Modernism." Op. cit. Along with Kandinsky, they are both part of a current book project: *The Energies of Modernism: Art, Science, and Occultism in the Early 20th Century*. For *La Vie Mystérieuse* and a sampling of occultism in Paris, see L. D. Henderson. "Mysticism, Romanticism, and the Fourth Dimension." *The Spiritual in Art: Abstract Painting 1890-1985*. Exh. cat. Los Angeles: Los Angeles County Museum of Art, 1986. 227-28. Print.

Linda Dalrymple Henderson is the David Bruton, Jr. Centennial Professor in Art History, a University Distinguished Teaching Professor, and a Regents' Outstanding Teaching Professor at the University of Texas at Austin.

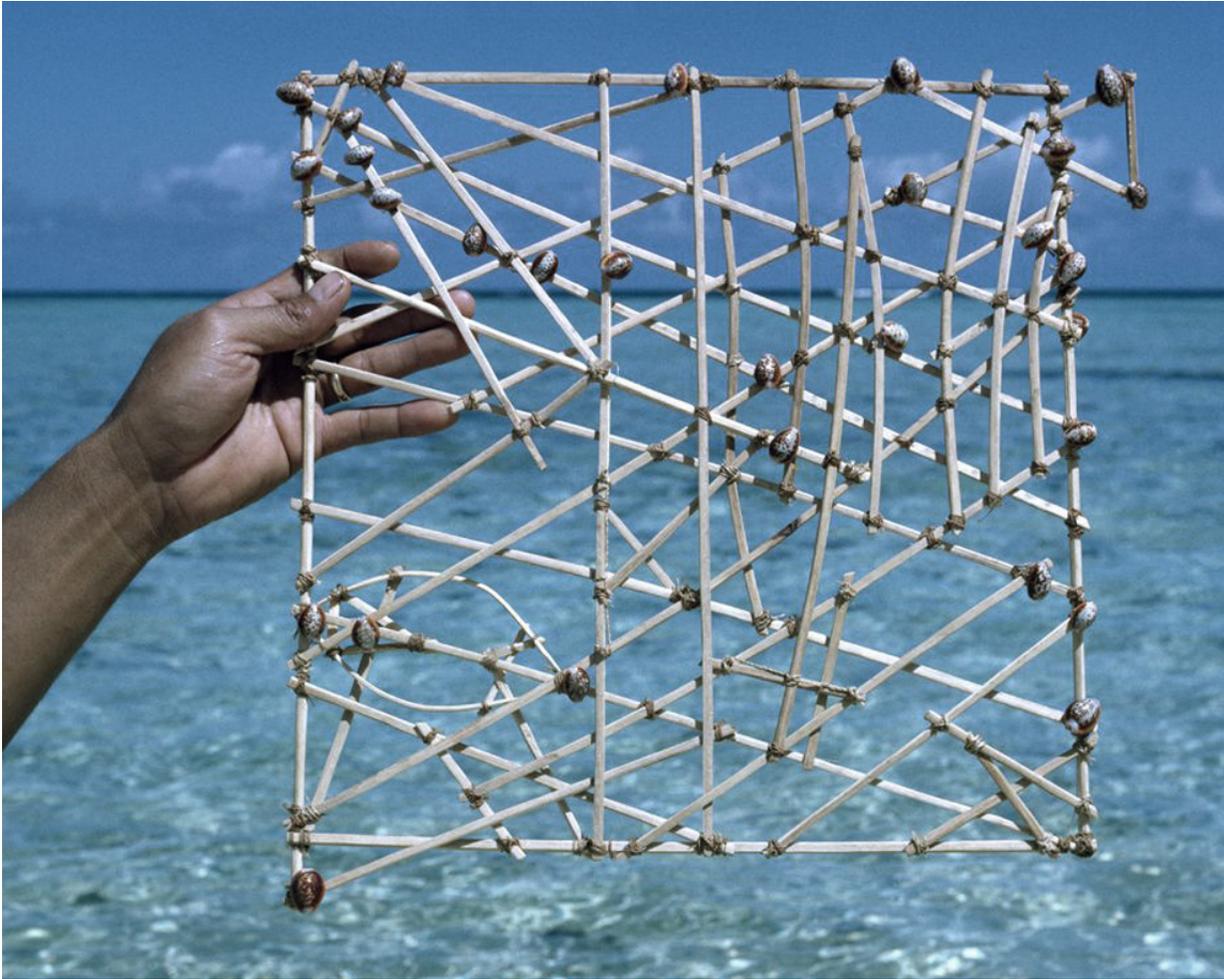
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## The Way of the Pacific: Glass Bead in conversation with Freeman Dyson

Freeman Dyson

Freeman Dyson is 93 years old. He is one of the most prominent physicist and mathematician of the past century. His vast contributions to science range from the unification of quantum electrodynamics to the conception of nuclear propelled spaceships. All throughout his intellectual career he has had a constant practice of scientific and literary thought experiments which he compiled in a great number of books and articles. Glass Bead went to meet him in his office at the Institute for Advanced Studies in Princeton to talk about these speculations. As planned, things took a cosmical tangent.



Micronesian Stick Chart (Photograph by Walter Meayers Edwards)

**Glass Bead:** In a 1960 article,<sup>1</sup> you speculated on the possibility of a mega structure built around the sun and capturing its radiation for the energetic demands of a future type of civilization which would live on its inner surface. This structure, which later came to be called a “Dyson sphere,” opened the path to numerous wild interpretations and misunderstandings. What was your original intention when talking about such a structure?

**Freeman Dyson:** I might just say how this idea started. I have always considered the future of life in space. That was my concern since the beginning. It mostly came from my reading of science fiction and, actually, if any name should be attached to this object it should be Olaf Stapleton,<sup>2</sup> not mine. Anyhow, I think it was in 1960 when SETI [Search for Extra-Terrestrial Intelligence] first suggested listening to radio signals in the sky. Listening for alien signals was certainly a good idea, but I remember saying to Philipp Morrison, who was heading the program then, “But what do we do if the aliens don’t want to communicate?” So it occurred to me that the thing we would need to do is to

listen for infrared radiation instead of radio. Because if you have a civilization that is using a lot of energy, it has to radiate some waste heat, and waste heat is infrared radiation which we can detect. But then, the question became: what would you actually be seeing in such a case? If you did detect infrared, it would have to be coming from a big surface because that's what it takes to radiate large amounts of power. So it had to be a big surface of some kind, and I suggested it would be coming from an "artificial biosphere." That's the word I used, and that was misinterpreted as a big round ball. Of course, it doesn't have to be a big round ball; it is most likely to be large objects orbiting around the star.

GB: So this idea of a large ball encapsulating the sun wasn't your plan? You didn't describe such an object?

FD: No, never. I simply used the wrong words. I said: if you take planet Jupiter and spread it out around the sun, it would make a sphere 5 meters thick. So that's where it comes from. Anyhow, what I was interested in at the time was not at all the structure itself and its engineering but a new way to look for aliens. If you look at what really happened, twenty years after I made this suggestion, we did have the first sky survey in infrared with the IRAS satellite. That was an infrared astronomy satellite. They did a sky survey in exactly the right wavelength, and of course the result was that the sky is full of these objects: there are millions and millions of such objects all over the sky, and obviously most of them are natural. They are actually young stars so the dust is still there. So you have a young star with dust around it, and the dust is warm; it radiates. And that is what we see: there is no way to tell whether it is artificial or natural. So in fact it is not a good way to look for aliens.

GB: Do we have any tools to detect this distinction between the natural and the artificial?

FD: Yes, of course. At the moment there is big excitement because we have the Kepler mission, which is actually looking at stars with very precise photometry by measuring the brightness of a star much more accurately than we ever did before. It is a wonderful mission. Its main purpose was initially to discover planets—and they did discover about two thousand planets going around other stars, and this is of course a huge step forward—but what is also true is that when you do that you discover a few other things as well. As a matter of fact, there is one very particular object which is now very much being talked about: it is called the KIC 8462852. It's one of these stars that shows very strange absorption of light (much more than a planet), with its light turning off something like twenty percent and coming on again, and it's not periodic, so it might be that it is truly an alien civilization. Of course everybody is thinking that it might be the

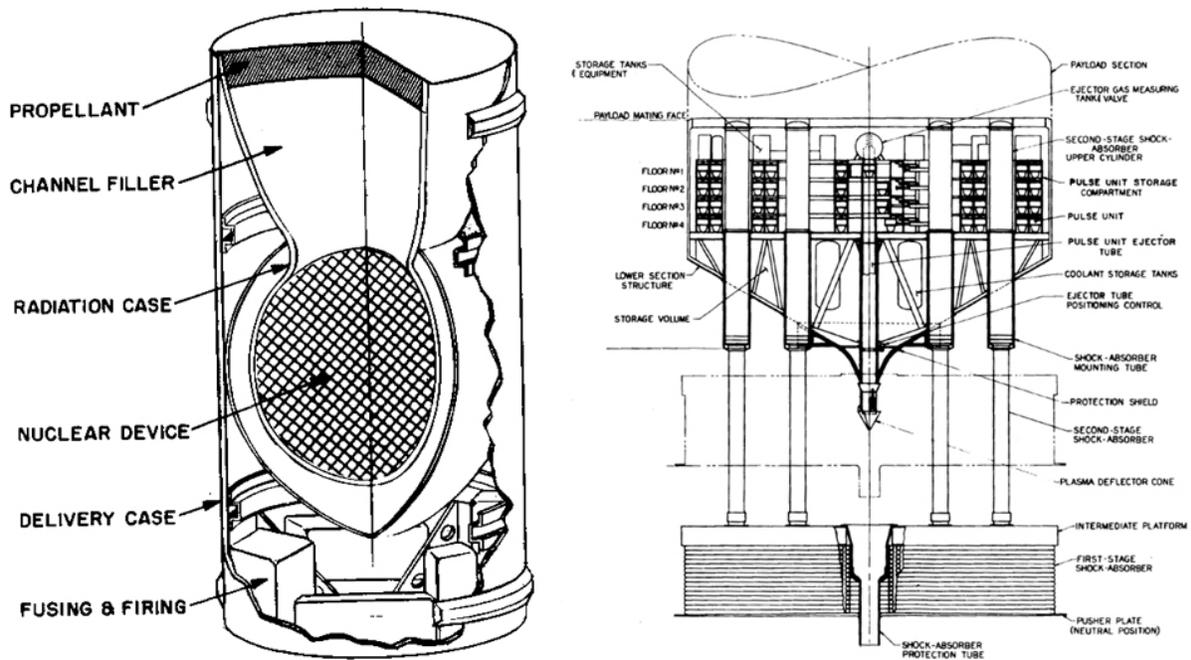
explanation, but until now we know nothing much except the light absorption. So the next thing many people are now planning to do is to observe it in different ways. And the most obvious one is to look at it with a very good radio telescope. That will be done. So with these radio signals, if it is artificial there should be something to see. But if we don't find anything in the radio, then probably it is natural, and in that case we will have to look at other channel x-rays and different good spectroscopy. This is certainly a good time for looking for aliens.

GB: You often speak of another specific technique for looking for alien life which you call "pit lamping," a Canadian hunting technique used to detect nocturnal animals by shining a spotlight in their eyes. You suggested that a similar technique could be used to detect creatures which, while living in remote parts of outer space, would have developed some kind of lens to concentrate light. Could it be used in this case?

FD: If you want to keep warm away from a star in a very cold space, you have to have something like a big mirror to concentrate star light. If you have a big mirror concentrating starlight and your living creature can be at the focus, it can stay warm. So that's what would have to happen if life were to spread far out away from a star. But unfortunately this object they have now discovered, KIC 8462852, is so far away from us. With pit lamping in this case, it would take more than two hundred years to get the light signal back. Pit lamping from Earth can work as far the Kuiper Belt, but not much further unfortunately.

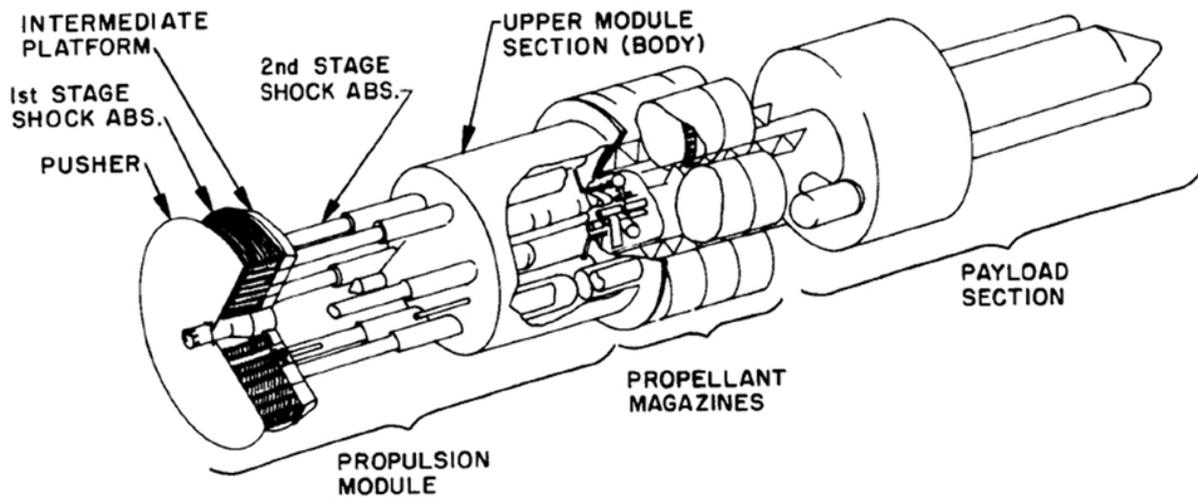
GB: Around the time you published these speculative articles and thought experiments on artificial radiations and extraterrestrial life, you were involved in an actual large scale engineering project called Project Orion,<sup>3</sup> the study for a spacecraft which would be propelled by atomic bombs. I even read somewhere that you were actually planning to go on board and leave. Can you tell us more about this project and your involvement in it?

FD: Well the project for that was very clear: we wanted to go first to Mars and then to Enceladus, one of the moons of Saturn. We had chosen Enceladus as a destination without knowing how interesting it actually was. Although we now know it is a very active world with all kinds of mysteries, for us at the time it was pretty much just a point in the sky.



Orion's design for Propulsion Unit and Propulsion Module. (Nasa)

This was in the days before we had long distance communications, so we were thinking of ourselves like Darwin going on board his ship the HMS Beagle for five years to explore the world, and then coming home and writing books. That was the idea we had: that we would go with this Orion ship and walk around Mars and walk around Enceladus and other places and write down everything in notebooks, and then we would come home five years later and tell the world and spend the rest of our lives writing books. That would have been a wonderful trip, even our son who was then five years old wanted to come. But anyhow it never got to fly.



Key Components of the Orion's Spacecraft (Nasa)

GB: I know the project was abandoned, but I was wondering, what could really have happened in space travel if it had been taken on?

FD: We would have been very far ahead. We would have explored the solar system fifty years sooner. But what happened is that the instruments got very much better. Now we have broadband communication even from Pluto, so that the old-fashioned kind of Darwin expedition makes no sense at all. Everything can be done in real time, communications both ways with much smaller and much more powerful instruments, so you don't actually need humans for doing scientific work. The idea of Darwin-style exploring is completely obsolete.

GB: So manned space travel has to be given up entirely?

FD: Well, it doesn't have to be given up, but it is not for science. It is an international sporting event. The public is willing to pay for sporting events, and it should be sold as such—not as science. That was the mistake they made with the moon project: it was sold as science, and of course it wasn't at all.

GB: How close were you to actually building such a spacecraft?

We were in the competition for the moon exploration and we started about the same time as the Apollo program, which was based on chemical propulsion. So I would say for about a year we were really serious. We thought we had a chance if everything went well, but of course we didn't have anything built at that time. It was only plans. By the second year it had become clear that Von Braun was going to win. He was much more organized. He had a big space center working for him, and he was also a very capable manager. For

us, most of it was purely theoretical. We had plans, but we never got to the point of doing things on a big scale. So the project lasted seven years in total, but after the second year it was really not for real.

GB: Do you think this technology could be taken on again?

FD: No, never. It is absurd. It is completely absurd when you now have instruments which are so small. The thing about Orion is that it had to have a thousand tons of payload. Now we wouldn't know what to do if we were to have a thousand tons of payload.

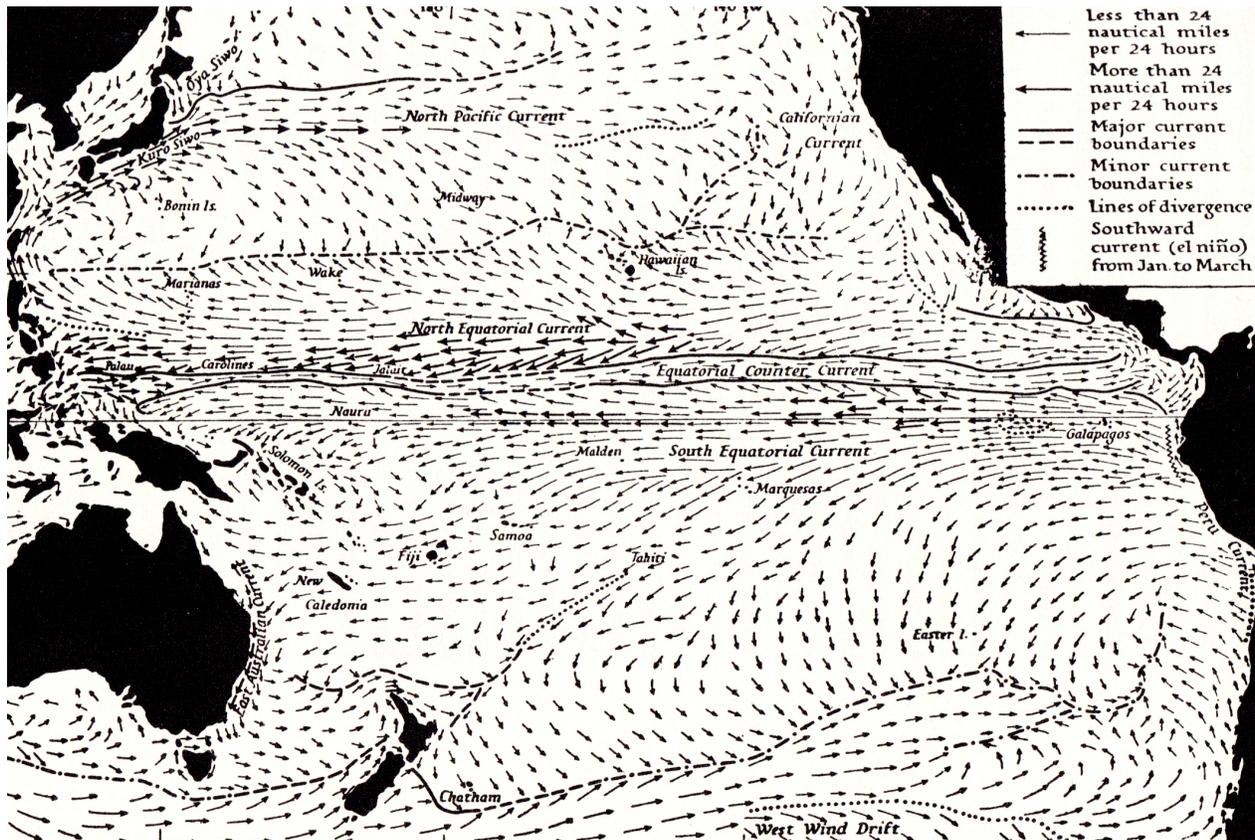
GB: What about the speed it could allow?

FD: Well, it is good for the solar system, but not good beyond. Beyond that, what you need are laser beams. They are much better. This is a public highway system, so you don't take the energy with you; rather the energy source remains fixed. You have a huge laser in space which is using sunlight as a generator. The laser beam is pointed wherever you go and then you ride the laser beam using this energy. And for sure, that's much more efficient than all the things we worked on before. There has been some quite serious engineering in that direction, and it will be built. The problem for now is that any public highway only becomes cheap after you have a lot of traffic on it. So this technology has to get over this first bump, which is not easy. I would say it would take a hundred years to have it in the vicinity of the earth. As with any apparatus of this kind, you have to have growth which is very slow for quite a long time, and then it will be much faster as it becomes cheaper. Much like airplanes, which were just toys for the rich in the early times, and became cheaper when they were developed as weapons, and then became the public highways we have today.

GB: It seems to me that space travel, at least in films and the collective imagination, is always thought of in terms of our coming back to Earth. The type of speculations that you have written seem on the contrary to invite a type of travel and exploration where there is no coming back. Could you elaborate on this distinction?

FD: Yes, for me there are two different ways of exploring: the Atlantic and the Pacific. They are really quite opposite. In the Atlantic type of exploring, you have someone like Columbus and his ships and the idea that he would get to China and then come home again. The whole idea was to make a big voyage to some place and then come back. That was his plan, and that's what he did. It just happened to be America instead of China but the system was nonetheless some kind of top-down exploring. Going and coming back. In the Pacific type, you had Polynesians going with their canoes with no interest whatsoever in coming back. They wanted to find places to live in. And they did find

islands: they found New Zealand, they found Hawaii, and went on and on as far as they could without any idea of arriving at South America, as this type of goal wasn't the point at all. Anyhow, in terms of space travel I would like the Pacific model much better because they were not linked to any limited object; they would just go further, and their children would go further in a process that has no end.



Winter circulation of currents in the Pacific Ocean (In "We the Navigators" David Lewis, Australian University Press, 1975)

By the way, did you ever read Kenneth Brower?<sup>4</sup> Kenneth Brower actually worked with the people in Polynesia. He organized a voyage using ancient Polynesian technology so they had a big canoe and sailed using only the Polynesian methods. They sailed from Hawaii to New Zealand, and he wrote books about this, giving a precise account of their navigation techniques. It is quite astonishing how well they can navigate; simply by following the birds and studying the patterns of waves on the ocean they are able to determine the location of islands which are quite far away. So it was in no way by random chance that they found these islands; they knew how to find islands.

GB: When thinking of space travel, what are these tricks we can use for ourselves? What is the outer-space equivalent of birds and patterns of waves in the Pacific?

FD: Warmth happens to be something we are very sensitive to; we can detect it from very far away, and our instruments are amazingly good. Anything warm of course produces radiation, so we can detect a planet certainly from a long distance away. But for the smaller objects that are cold, it is not so easy, and as I said “pit lamping” doesn’t work so well because it goes with the inverse fourth power of distance. So it is not good for long distances. So that is really an unsolved problem for now.

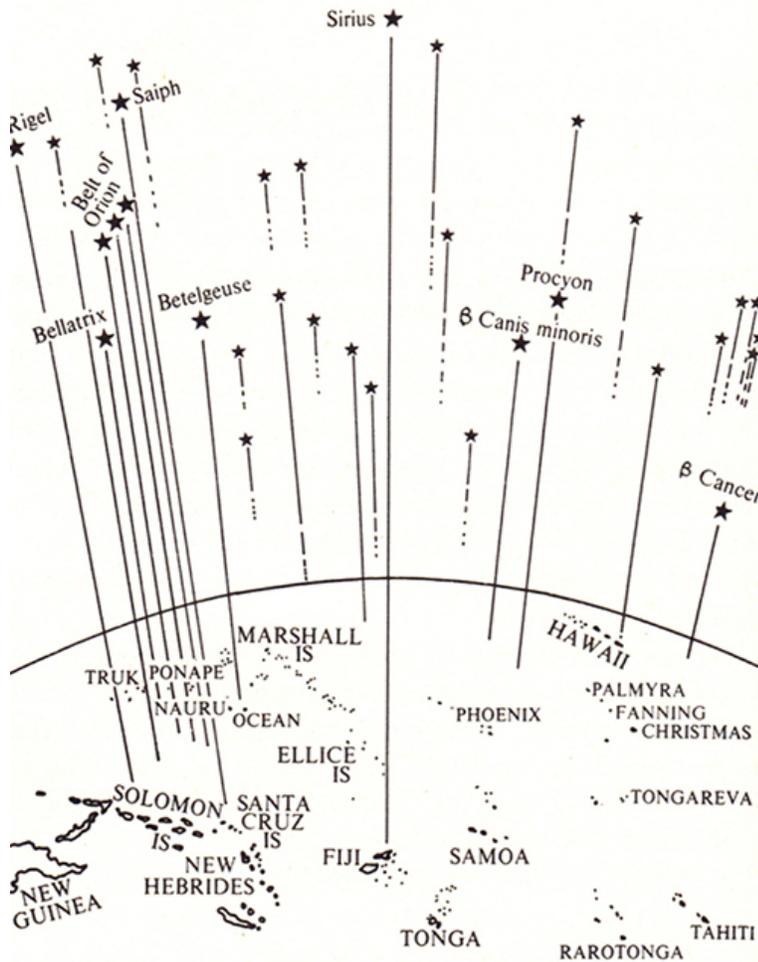
GB: How would such a process of drifting through space influence our evolution as a species?

FD: The point is that it is life as a whole that is moving out—not just humans. Life is of course always changing and every species has a choice: either you go extinct or you diversify, become many species. That has always happened. It doesn’t just stay the same. Undoubtedly, as humans spread out in space, either we will become extinct or we will become a hundred species, a million species. That’s the way life works.

GB: Could it be that life itself would change in such a drastic way that it would become fully unrecognizable as life?

FD: That is possible if we spread out in space, but on this planet, life has stayed remarkably constant for most of the three or four billion years. The structure of a living cell has changed very little. Most of the essential features were there from the beginning so I don’t know whether that will change or not, but certainly what has happened in the last three billion years is that the arrangements of cells of course have changed, but the cells themselves have not changed much. So I would not expect any radical change here, but it could happen.

GB: Recently, you have made some strong critical claims about what you see as the failure of artificial intelligence over the past sixty years of AI research. Your argument is mostly aimed at the inadequacy of the models of intelligence we use in such projects. Following from what you just said, it seems that the type of intelligence you are talking about is an intelligence embedded in a process of ongoing departure and navigation—a migrant intelligence of some sort.



Zenith star passing over Fiji (In *We, the Navigators*. David Lewis, Australian University Press, 1975)

FD: It is true. As humans we started in Africa and lived in a certain pattern, and after we moved out and came to the North, particularly East-Asia and Europe, the conditions for life were much more harsh. Europe was half covered with ice and humans had to stay alive, learning to keep warm and managing to coexist in caves. That undoubtedly stimulated a different kind of intelligence. Surviving in such conditions required a very high degree of collaboration and the ability to change our habits very quickly. These drastic changes resulted in different kinds of people and societies. This is certainly also true for the future of life in space.

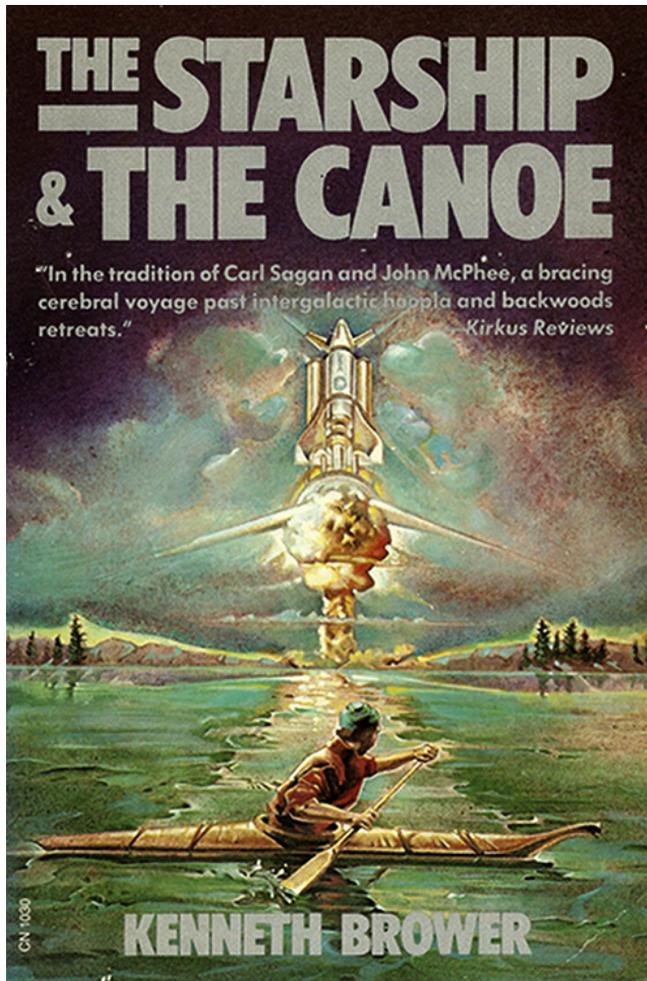
GB: Are you calling for a “Pacific” type of model for intelligence?

FD: What we will certainly learn from the Kepler mission is that there are billions of planets in our own galaxies, many of them not attached to stars. There are billions of planets and even trillions of small objects floating free in the galaxy, so as we move out in space in a “Pacific” way of traveling, we won’t have to go from star to star, as they are many places in between where we can stop. The point is that if we have a billion different

habitats where life can be established, and every place with its own evolution, this will result in a huge variety of ways of living, and most certainly in very different kinds of intelligence.

GB: Regarding the artificial intelligence we are now actually trying to build, can you explain more precisely why you think it is a failure?

FD: Well, merely because we are using digital machines, and these machines are designed for a different purpose. They are good at doing numerical calculations and to do so they have to reduce everything to 0 and 1. That's not the way a brain works. If you look at your own brain, as far as I can tell, you see images, pictures, which come and go very fast. You can immediately recognize a face or a voice. These patterns of sound and light can actually be recognized directly by our brain and I don't believe we are dividing them into 0s and 1s. It certainly works for language because it can be discretized, just as babies have the ability to reduce speech into phonemes. But the human brain doesn't just recognize syllables, it recognizes sentences and ideas. When we are listening to speech we listen to the whole sentence, which is immediately translated into meaning. That's clearly something a digital machine is not good at.



Cover of Kenneth Brower's *The Starship & The Canoe* (Harper & Row, 1978)

GB: Finally, there seems to be a consensus today around preservation of the conditions of life on this planet, some might say a kind of ecological conservatism. I think you are quite opposed to such views, can you explain why?

FD: Well, I think it probably comes from being a child in England in the thirties. If you look at England as it now exists, it is heavily populated and there are all kinds of ugly buildings and ugly disturbances, but somehow it is still a beautiful landscape. It is still a lovely place for humans to walk around, and that's the environment I grew up with. Even though it is all artificial, I feel it has a great beauty to it. Nothing which is there was there ten thousand years ago. Ten thousand years ago, it was nothing but forests, what we now call wilderness, but I think it was much less interesting than the modern landscape, which is of course far more diverse and rich. Modern landscapes have forests, farms, grasslands, in great variety—some of it natural, some of it artificial. In my view, it is

much more beautiful now than it was in its natural state. It is my also my feeling about the whole universe that it is sort of boring the way it is now. If you look at it, all the planets except this one are dead.

GB: So you mean it is our responsibility as humans to transform it?

FD: Yes.

Interview conducted for Glass Bead by Fabien Giraud.

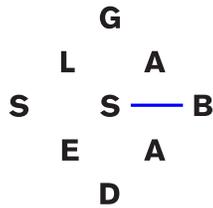
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## Footnotes

1. Freeman Dyson. "Search for Artificial Stellar Sources of Infrared Radiation" *Science* 131.3414 (June 1960): 1667-1668. Print.
2. Olaf Stapleton. *Star Maker*. London: Methuen Publishing Ltd, 1937. Print.
3. Freeman Dyson. "Interstellar Transport." *Physics Today* October 1968: 41-45. Print.
4. Kenneth Brower. *With Their Islands Around Them*. New York: Holt, Rinehart and Winston, 1974. Print.

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Freeman Dyson's most useful contribution to science was the unification of the three versions of quantum electrodynamics invented by Feynman, Schwinger and Tomonaga. He subsequently worked on nuclear reactors, solid state physics, ferromagnetism, astrophysics and biology, looking for problems where elegant mathematics could be usefully applied. He has written a number of books about science for the general public.



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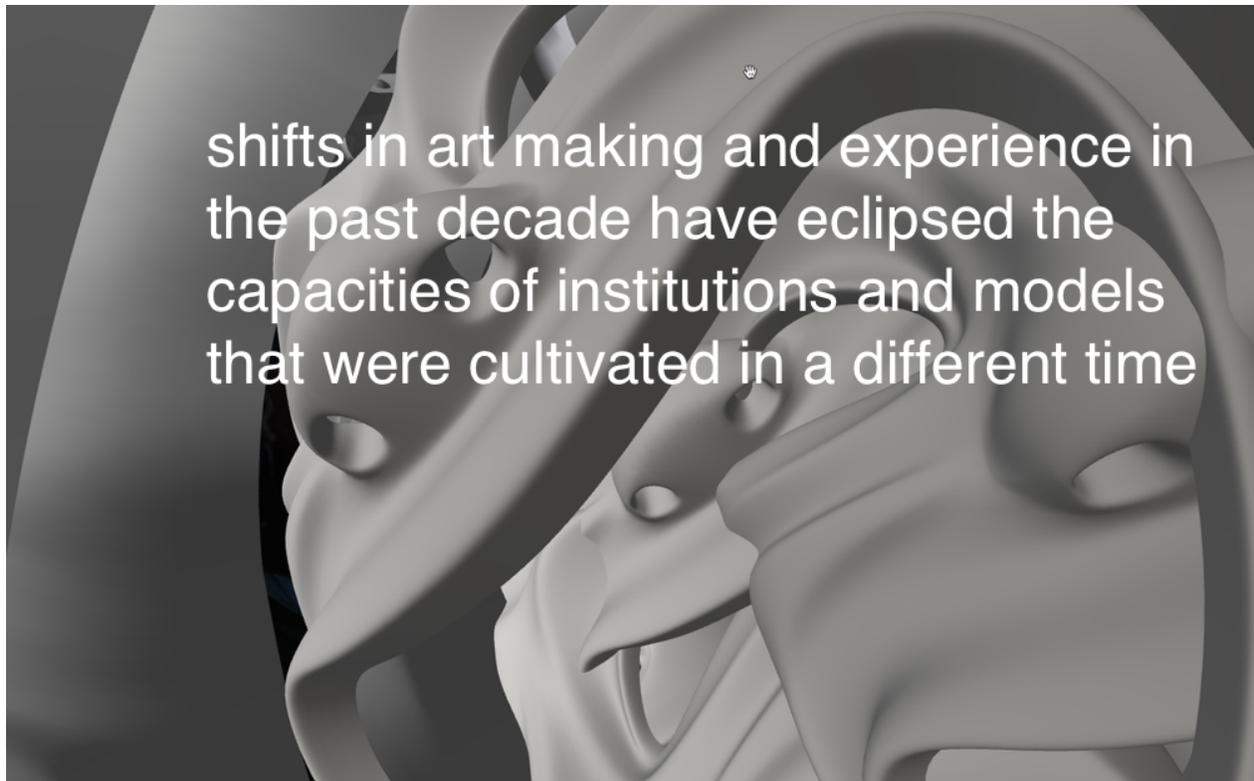
## Re-Engineering Hegemony: Glass Bead in conversation with Mat Dryhurst, Holly Herndon and Alex Williams

Alex Williams,

Holly Herndon,

Mat Dryhurst

Music, unlike many other forms of art, has long been recognized to serve more than an ornamental or representative function. Plato acknowledged the capacity of music to ‘mightily fasten’ to the inward places of the soul.<sup>1</sup> Studies in evolutionary musicology have investigated how music may have served as the basis for social cohesion in early hominids groups, and some have argued that this was a necessary factor in the development of complex intelligence, the synchronized coordination of bodies and the expansion of memory and anticipation.<sup>2</sup> Jacques Attali further claimed that the changing form of music is a historical process, deeply bound up with the wider political economy, that not only expresses but is *prophetic* of future forms of social organization.<sup>3</sup> Singularly placed for elaborating the efficacy of music in this regard, we invited Holly Herndon, Mat Dryhurst, and Alex Williams to discuss with us their shared cross-disciplinary interest in speculatively orienting art, technology, and politics toward the future.



Text overlaid on image created by Mat Dryhurst modding Akihiko Taniguchi's software (Mat Dryhurst, 2016)

**Glass Bead:** It can be argued that contemporary art is characterized by a fetishization of indeterminacy, and that there have been parallel tendencies within music and sound art. This fetishization is problematic on a number of levels; it is complicit with neoliberal hegemony, it is generally anti-rationalist and offers no constructive orientation to the future. On the other hand, there has been a progressive expansion of the space of music, and a rational exploration of complex sound and noise. What do you think about the development of music with regard to these two perspectives and the polemics that underlie them?

**Mat Dryhurst:** To be frank, I feel at all levels that the game has changed and we are in a process of reconfiguration to try and catch up with it. We were just discussing how the ceremonial and archaic aspects of playing in the music world, or contemporary art world, feel to a degree like playacting. One has to acknowledge them to make a living and participate, however it is clear that we are perhaps a transitional generation, that shifts in art making and experience in the past decade have eclipsed the capacities of institutions and models that were cultivated in a different time and for a different function than is perhaps required today. It is also clear that the game has shifted in accordance with the neoliberal hegemony you describe, but we cannot wince at that, as it is too crucial.

It's one of the things, I think, that excites us most about the group of characters you could crudely describe as the left accelerationists—this idea of surveying emerging relations and shifting modes of power and attempting to modulate our activities to antagonize or exploit those new channels. We are obsessed with YouTube stars, not always for the quality of the work being made, but for how distant the rules of engagement are with anything that has existed previously in an arts context. I see most contemporary artists now as simply curators of phenomena that they have witnessed existing in the *real* cultural battlefield—snippets of something happening in Eastern Europe, a font from here, a reference to an obscure YouTube trend from kids with cell phones in Chicago. This is an indeterminate, prostrate state—one that normally ends in a conclusion of “IDK WTF to do. There is just too much, but this looks nice.”

The challenge is to not simply observe this world from the outside, and congratulate ourselves for the conversations we follow, but to *participate* within that culture and exercise some of the ideas and models we believe in within an arena that has legitimate impact. This is really hard, but ought to be the goal. The great opportunity, as you described, is that this new environment is pretty open to things that traditionally may have been marginalized—Metahaven and others have talked about how comedy, for example, *won the web*.<sup>4</sup>—and in a sense this new landscape favors sharp minds with the ability to produce work quickly and pointedly—which is why I find Ben Singleton's works on *Metis*<sup>5</sup> and the introduction of Francois Jullien's *Treatise on Efficacy*<sup>6</sup> to be so essential. It's also part of the motivation behind my Saga project,<sup>7</sup> which prioritizes time and context specific expression (a comedic trait) and also the need for us to begin to start dealing with the new era of personalization that has been ushered in by a web driven by advertising and the desire to target us as individuals.

I did a talk for PAN a couple of years ago, speaking of the need to appreciate micro gestures online, as allegro (alacritous) notes in one unfurling composition, and think that there is merit to reconfiguring our appreciation of art production in this new climate through such a logic. Models exist to facilitate such a shift; we just kind of need collective will to start participating within them. Which isn't to say there isn't merit in utilizing old industry. There is a lot of good will around the music industry, for example, and a lot of knowledge that can be repurposed towards new ends, but I'd rather see these institutions as modules in a larger project.

**Holly Herndon:** There is sometimes a strange false dichotomy in musical discourse between the rational and emotional. I find this particularly frustrating because I try to make work that deals with both. There's a tendency in music to rely on emotional tropes,

particular vocal inflections, instrumentation, swelling, or chord progressions, to express a depth of emotion. While I of course also draw on a shared musical language, I'm more interested in developing new motifs to express new emotions, which are usually directly tied to the underlying concept of a work. Mat and I develop musical processes that deal with the subject matter of the piece, tying in production, text and delivery. This to me is both more conceptually and rationally sound, as well as more emotional.

**Alex Williams:** Matt and I discussed online a little while back the fetishization of indeterminacy in the guise of a sort of complexity porn. This is something that interests me in a number of registers: aesthetic, yes, but also theoretical, scientific, and political. There is an entire meta-ideological strand of thinking, from political theory through to contemporary art practice, that lauds the 'creativity' of being itself in ultimately indeterminate complex processes. This is either a sort of shock and awe aesthetic of the irretrievably intricate, or a 'lava lamp liberalism' of neovitalist animistic wonder. They slot in, as you state in your question, quite snugly into some of the fundamental intellectual beliefs of neoliberalism—principally Hayek's idea of spontaneous and unplannable order.

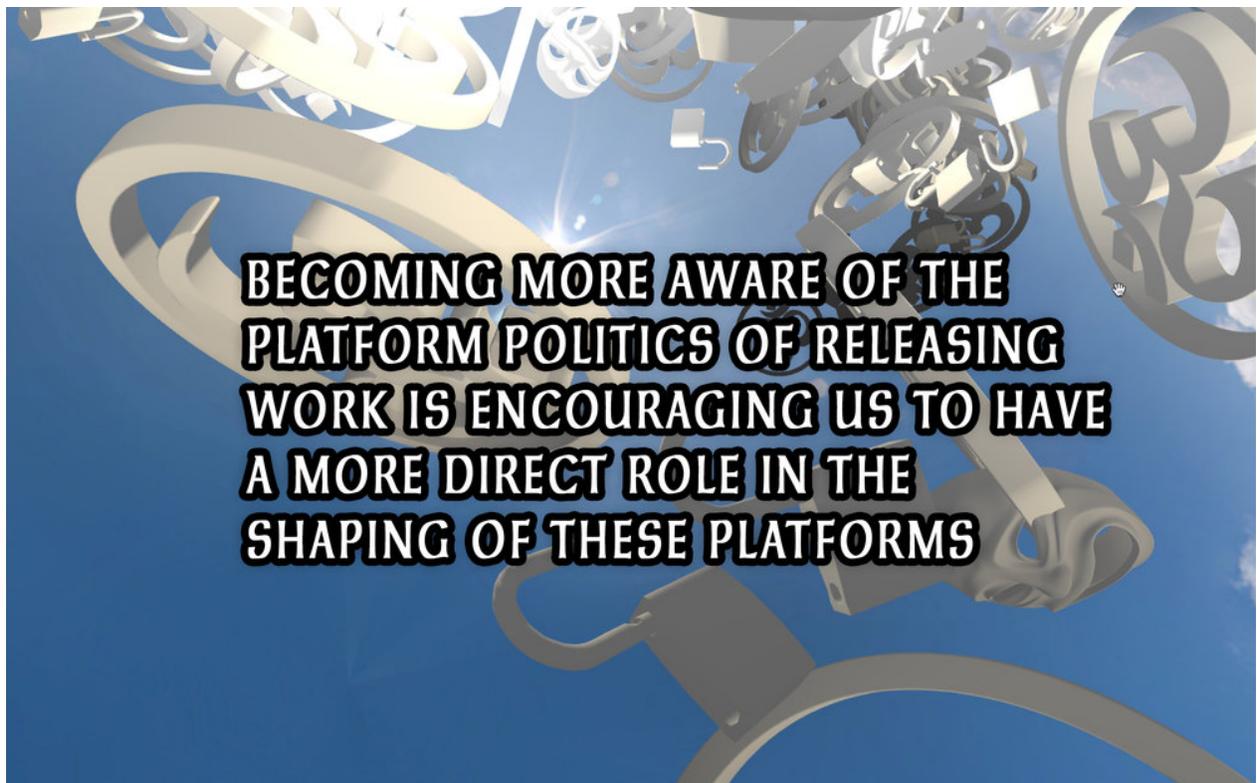
What I am interested in, in art as well as in politics, are those approaches that can mediate between irreducible epistemological complexity (where the world is too complex to ever understand, 'master,' or manipulate) and older discourses of absolute understanding and control (i.e., Laplace). Put much more simply, the world and its phenomena *are* complex, but not purely indeterminate. To act in such a world requires us to understand the patterns that are formed, even in highly complex domains. For art, even if the original work itself is rigorously indeterminate, our pattern-locating mentalities will tend towards projecting patterns onto them. Suffice to say, however, the best (academic?) music today combines a formal complexity with an overarching aesthetic design. At its best, this matches a compositional complexity with the sensory register, enabling us to 'hear' the process, albeit often processes very different from traditional western harmonic resolution, and hence to find order within the complex.

**HH:** This speaks a little to what I mentioned above in tying process to concept, which is of course much more possible when dealing with electronic media—i.e., a song about surveillance can include self surveillance software, etc. When successful, the very sound or aesthetic of the piece can convey the idea.

If we think of the container, as the form of the piece, it holds smaller complex cells with complex relationships to the other cells. A sharp ear could be able to recognize these relationships and gain an aesthetic experience from that understanding. The problem is

that in certain communities not all dialog is considered valid, and I personally think that the definition of those cells should expand. For example, the politics of choosing a specific drum pattern with a specific drum kit; this is a dialog within dance music communities, which would not be placed on the same level as the dialog of timbre and pitch class in academic circles.

I'm particularly interested in the pop music container, because it can act as a sort of Trojan horse, to borrow from my friend Benedict Singleton. Using custom and experimental software, I can create complex timbral shifts and rhythmic inflections, or cover political ground, but also participate in a shared cultural dialog that is happening outside of niche music communities. This is the sweet spot.



Mat Dryhurst modding Akihiko Taniguchi's software (Mat Dryhurst, 2016)

GB: Holly, you have an album named *Platform* after Benedict Singleton's theories about the strategic operationalization of contingency, and Mat, as well as your collaborative work with Holly you've designed an embeddable platform for self-hosted, website-specific artworks (called Saga) and talked about platforms in terms of the political economy of music in the digital age. Alex the concept of repurposing has played

an important part in your thinking, and you've recently written about the politics of platform dynamics. How can the logic of platforms be usefully applied to music, both at the level of aesthetics and politically speaking?

AW: Platform logic, if it can be reduced to a singular idea, is a matter of generative entrenchment. This is the philosopher William Wimsatt's term for a basic feature of complex adaptive systems of all kinds: they feature building blocks that operate as relatively stable platforms for other entities to build upon, and in doing so, in generating the behavior and structural possibilities of other entities, they become entrenched, hard to shift.<sup>8</sup> Generativity and entrenchment are therefore deeply coupled together. The more generative something is, the more difficult, or costly, it will be to shift or transform. This is, if you like, the basic diagram of the platform.

Music, at multiple levels, displays platform logic. Think of something like genre, for example. In dance music, genre is most often constructed around some basic conventions (BPM, beat structure, instrumentation choice). This generic setup is most powerful when it is capable of operating as a flexible platform for multiple different realizations—for example, the basic four-to-the-floor house and techno beat structure is incredibly simple, yet supports a vast array of different aesthetic realizations in practice. Alternatively, we could think of certain forms of tuning and pitch systems, and the way they operate as an invisible ground for much music-making practices. So the logic of platforms is already at work in basically all forms of music making.

The political side of platforms, as I understand it, comes in the way they recede into the background. They are literally fundamental, in the sense of being the ground on which practice occurs, yet successful platforms have a tendency to appear merely neutral. In this sense, they can control and guide action occurring atop them. In terms of IT platforms, the license to print money which Microsoft, for example, obtained in the nineties with Windows, was entirely about its ability to function as a smooth, apparently neutral platform environment. In the business studies literature on platforms, the ability to present yourself as a neutral space is deemed extremely important.

Beyond a certain tipping point, platforms become difficult not to use. All this means that power, and a conservative form of power at that, is deeply involved in platforms within the human world. But I think it is also important to emphasize that the reason platforms become successful is partly because they enable you to do things; they are productive, generative. Those seeking to oppose a given platform—a technical one, like Microsoft, Google, or Apple, or a political one, like Neoliberalism, or an aesthetic one, like conservative genre boundaries or tuning systems—have to remember that. It implies that

a purely negative or transgressive project will be unlikely to be able to seriously disrupt the functioning of existing malignant platforms. Only the building of new, better ones, will suffice. Or perhaps the re-engineering of those already in existence.

MD: I totally agree with Alex's point about musical convention as platform, and that is something Holly has spoken of a lot in the past; you basically have an entrenched language with which to express yourself as liberally as you can. I also think we see eye to eye about the need to re-engineer existing platforms such as the music industry, which I touched on a little bit before. One addition to this, I would say, would be the studying of social platforms that have always existed but perhaps have only been acknowledged since the advent of social media.

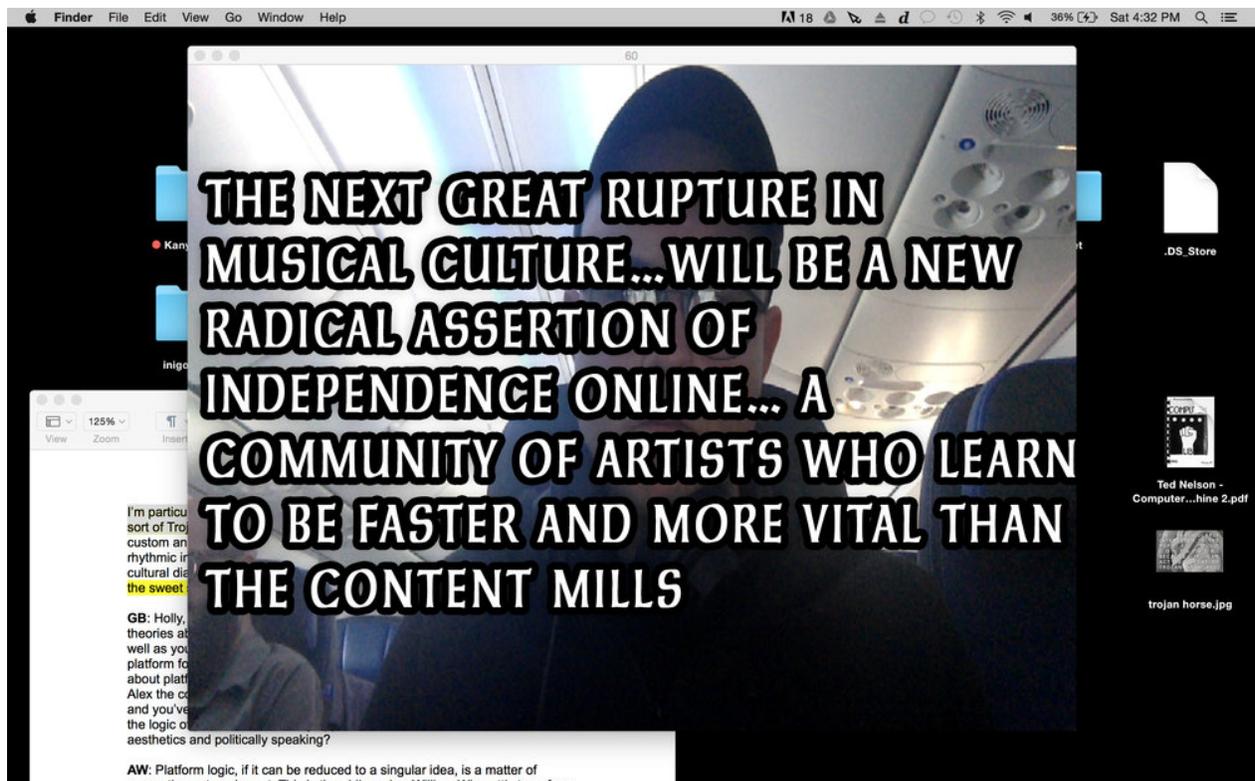
Art History, or Musicology, is often quite poor at identifying the idiosyncratic social elements that led to many of the canonized milestones of the evolution of the medium, the webs of influence, finance and opportunity. There is a reason we know who John Cage is, less so Harry Partch. I remember Holly writing a paper about Mary Bauermeister once, whose money and social circle contributed so greatly to Stockhausen's career and thinking—and without being too conspiratorial I believe there is real promise in understanding how these cultures were formed, with less emphasis on the icon and more emphasis on the platform that made the rupture possible. That was one of the goals with the ongoing *Platform* project, to emphasize the web of actors who contributed to its construction as a way of addressing that opportunity.

I remember being really struck by Reza Negarestani's mentioning of *Taqiyah* in *Cyclonopedia*,<sup>9</sup> this idea of dispersed satellite agents, waiting to be activated, which also parallels the most promising aspects of John Perry Barlow's 'A Declaration of the Independence of Cyberspace'<sup>10</sup> which featured quite heavily in the track 'Interference.' These kind of social platforms exist in all aspects of society—platforms of wealth and influence determined by family names, platforms of favor determined by affiliation to institutions.

How can we learn from those models to construct social platforms with more virtuous/tricky aspirations? Is there a core ethos with the flexibility to sustain the generativity Alex speaks of and actually be productive? It might seem ambitious but I think we can learn a lot from how the independent musical infrastructure was developed out of necessity and conviction in the eighties and nineties, which is something I'm preparing a presentation about this month, incidentally.

HH: We were interested in seeing the release of an album as a platform with certain mechanisms that may be experimented within. So much of this is dictated by industry. Really mundane things like brand recognition, etc. play a big role in how music is discussed, praising the lone icon. We tried to subvert this with the interviews and press surrounding *Platform*, asking how we can keep enough name recognition so that the work is sharable and infectious, but use the platform to highlight other people's research. Depending on the journalist, it was more or less successful. The same goes for performance, travel, etc. It has helped me to open up experimentation beyond the software or sounds alone, and this is really exciting, as sound is so often quite abstract. Becoming more aware of the platform politics of releasing work is encouraging us to have a more direct role in the shaping of these platforms, to see them as malleable and to view ourselves with agency.

Electronic music, a field where I spend a lot of time, is obsessed with aestheticizing dystopia; it sounds cool, it works in a dark club, etc. Don't get me wrong, I love a good dystopian catharsis too, but I see a need for that to be balanced with a feeling of empowerment and encouragement. Independent music has long been a place where communities feel emboldened to take on infrastructural issues. This is where we are trying to take the conversation in music.



Mat Dryhurst modding Akihiko Taniguchi's software (Mat Dryhurst, 2016)

GB: In Hesse's *Glass Bead Game*, the leading academics played a game of knowledge synthesis in which musical motifs, philosophical propositions and scientific equations are equally represented by patterned placements of beads. This fantasy presents an ideal unification of knowledge, but various developments occurring after Hesse's book certainly make transits and syntheses between different domains possible: in particular category theory and complexity theory but also computational modeling to some degree. How does your own theory and practice of music relate to the notion of universal synthesis allegorized in Hesse's game?

MD: I think it's an interesting analogy for what you guys are trying to do, and somewhat haphazardly what I think we have been trying to do. I did an interview a while back talking about how frustrating I find it that many people in the art world harbor this bias that once something *does something*, it's no longer considered art. In many ways I feel that is a really limited perspective, cultivated at a time when people did not have such immediate access to one another. It's hard to quantify, but there is a large community of curious (in both senses of the word) people in different fields who are all finding each other online, and this synthesis is occurring at greater frequency. It's the only area I want to operate in.

Perhaps this synthesis is already happening, and teenagers now are slightly confused at the distinction between fields and people's dogged identification with one or the other. Music is one way to participate in a synthesis of sorts, but everything we do is pluggable and gestures are not contained to one area or one purpose. The album is a Trojan horse for other elements. The live show is a gathering place and a performance. We just participated in a conference that began as a slack group. It is one thing to aestheticize this synthesis, which a lot of people have attempted to do in the past, and quite the other to embody this synthesis and take advantage of opportunities not previously available. It's something we talk a lot about, how there is a regrettable focus on novelty, awe and spectacle within both arts and technology; "It's like a sculpture, but *the internet!*" or "We made this building look like it was constructed from 16 million ants! Look at all the moving lines!" And in a sense this seems quite antiquated—when the real exciting areas of progress for me are the ways in which people have adopted quite simple, ubiquitous technologies and grown cultures from those new interactions and connections. That's why the live text stuff we do for the show is, in my mind, far more interesting a proposition, as it is an experiment in data mining, real time communication, and real time broadcasting that is triggered simply from checking Facebook and using text edit.

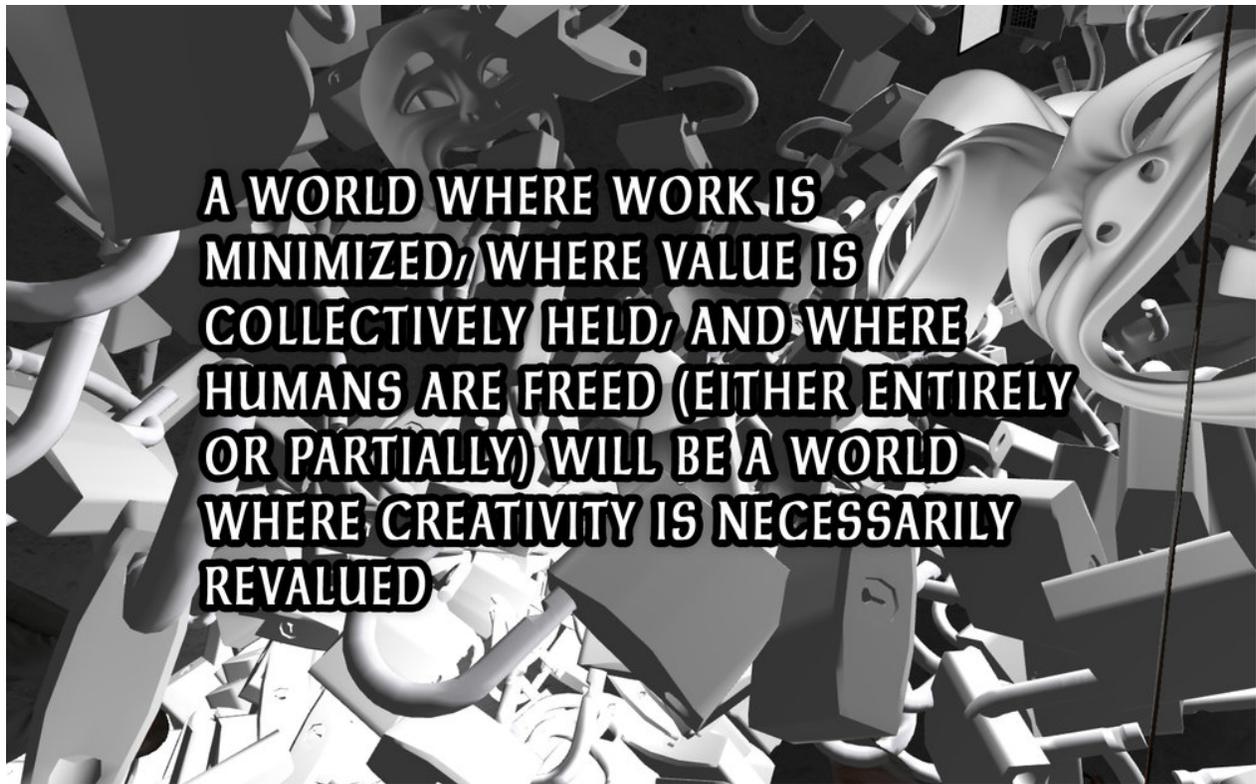
Those kinds of experiments don't position artists as people pawing at the window of culture, as detached curators of phenomena they witness online, or assuming some kind of removed, constructed stance, but as figures participating within a culture.

HH: It's a really lovely allegory. I've been fortunate to be involved with some institutions that take similar view, such as CCRMA or IRCAM. These are computer music research institutions where composers are seen as researchers who add value to the research progress. This requires a great deal of respect and humility on both sides, and when successful can yield amazing results.

GB: Alex, what are the political stakes of knowledge syntheses?

AW: In short, extremely significant. To summarize brutally, if politics is basically about power, and about how we can strategize within power relations, then the constitution of those power relations and our understanding thereof is key. But there is no simple, unitary way to understand all the ways that power is ramified, which means that any serious project to try and comprehend them is necessarily a highly synthetic one, expanding from the analysis of language to technology, energy networks, political organizations, economic systems, cultural production, identity and subjectivity, and so on. Mapping these formations and the complex interactions between them is a difficult task. Beyond that, there is the need to deal with the problem of complexity, which is based upon limitations of knowledge, and how to strategize on the basis of partial information.

I have proposed that something like *complex hegemony* can work as a conceptual container in which we can synthesize different forms of knowledge about power and the power of knowledge, while retaining local logics, or the fact that different fields of power organize themselves according to different rules and principles. Complex hegemony can then also work as a kind of technics (or macrophysics) of how power emerges out of the interactions of these distinct but overlapping domains or fields. This can then constitute a kind of strategic framework in which we can begin to conceptualize action, as necessarily always partial, revealing in the process of execution more knowledge as well as different capacities for action. Knowledge synthesis therefore underpins a kind of strategic synthesis of action, in a sense, ramified across domains, but with a quasi-intentional strategic orientation towards re-engineering power relations as a whole.



Mat Dryhurst modding Akihiko Taniguchi's software (Mat Dryhurst, 2016)

GB: Can you speculate on what a post-capitalist situation of music-making might be, or what might be some of the intermediary steps to its realization? Or, again this is both a political and aesthetic question: how can music reclaim the future?

HH: Just as the computer has freed me from playing each instrument individually and necessarily in real time, to shape other aspects of the music and vocal performance in real time, this will continue. In some cases it makes people lazy, and this creates boring, mechanical shows, but those who use that new freedom will create new forms of performance, i.e., if one parameter is automated, that means that you have the freedom to experiment with another parameter. Making music is becoming more like gaming, and almost anyone can participate, which is really exciting. This will change our ideas of virtuosity, and will open up entirely new conversations in a musical language that has been tied to five or six parameters for a very long time.

MD: I think music can reclaim the future by waking up and participating in its creation. I gave a talk a few years ago for PAN about an 'alacritous' music, that redefined itself by the logic of real time exchanges of information. It's also part of the logic behind the Saga project. We have found enough ways to create and exchange waveforms. I find that pursuit quite boring. The exchange of time and context specific gestures is at a premium, and I think finding a way to participate and complicate those exchanges is of paramount

importance.

I also think that algorithmic music is a distraction. What I cherish about music's power is its humanity and *live-ness*. I have said for some time that I think the next great rupture in musical culture (equivalent to the establishment of the independent distribution systems of the eighties and nineties) will be a new radical assertion of independence online—not a hermetic retreat, but a community of artists who learn to be faster and more vital than the content mills; artists who self-host and experiment with the means of dissemination so as to make the waveform economy look geriatric. I see traces of it happening and get very excited to think about what it might turn into with the right momentum.

AW: Thinking about algorithmic music—we've all heard and been disappointed by the sheer blandness of many attempts—but I'm not sure that this is some kind of human deficit, so much as the deficit in creative acumen of those crafting the algorithms themselves, which are in a sense merely another order of automation within the creative process, on top of existing processes of standardization (generic convention) or formalization (as in serialism and onwards in the 'classical' tradition).

In the book I've just written with Nick Srnicek, *Inventing the Future*, we discuss the ways in which left politics can be reoriented around a specific future trajectory: the struggle for a post-work society, which uses automation to liberate everyone from the drudgery, misery, and boredom of work. I don't think, however, that in the domain of culture this means, necessarily, a shift towards nonhuman creativity, per se. Instead, a world where work is minimized, where value is collectively held, and where humans are freed (either entirely or partially) will be a world where creativity is necessarily revalued. This will be as big a shift in the production, dissemination, and consumption of music as the invention of recorded sound, with highly unpredictable effects.

As to the role of music-making in post-capitalist society, this is obviously a matter of total speculation. There has been a strand of socio-musical theorizing (for example, Attali) which would point to the future of music as being one where we all compose, using technology to help mediate the way. In this sense, automation doesn't necessarily replace human creativity, but rather augments it, and potentially universalizes it.

Interview conducted for Glass Bead by Inigo Wilkins.

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## Footnotes

1. Plato. *The Republic*. Penguin Classics, 2007. Print.

2. Steven Mithen. *The Singing Neanderthals: the Origins of Music, Language, Mind and Body*. Harvard University Press. 2006.
3. Jacques Attali. *Noise: A Political Economy of Music*. University of Minnesota Press. 1985. Print.
4. Giampaolo Bianconi. "An Interview with Metahaven." *Rhizome*, February 2013. Web.
5. Benedict Singleton, "☒ (Notes Toward) Speculative Design", *Shifter Magazine*. Web
6. François Jullien. *Traité de l'efficacité*. Le Livre de Poche, 2002. Print.
7. See <http://accessions.org/article/saga-v1-0/> and <https://github.com/matdryhurst/Saga#saga>.
8. William Wimsatt. *Re-Engineering Philosophy for Limited Beings*. Harvard University Press, 2007. Print.
9. Reza Negarestani. *Cyclonopedia: Complicity with Anonymous Materials*. Re.press, 2008. Print.
10. Online at <https://projects.eff.org/~barlow/Declaration-Final.html>.

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Alex Williams is a political theorist.

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Holly Herndon is an artist currently based in San Francisco, California.

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Mat Dryhurst is a San Francisco-based artist, curator, and technologist who experiments with personal data.

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JOURNAL > SITE 0: CASTALIA, THE GAME OF ENDS AND MEANS | 2016

## Xenofeminism: A Politics for Alienation

Laboria Cuboniks



### ZERO

oxoo Ours is a world in vertigo. It is a world that swarms with technological mediation, interlacing our daily lives with abstraction, virtuality, and complexity. XF constructs a feminism adapted to these realities: a feminism of unprecedented cunning, scale, and vision; a future in which the realization of gender justice and feminist emancipation contribute to a universalist politics assembled from the needs of every human, regardless of race, ability, economic standing, or geographical position. No more futureless repetition on the treadmill of capital, no more submission to the drudgery of labour, productive and reproductive alike, no more reification of the given masked as critique. Our future requires depetrification. XF is not a bid for revolution, but a wager on the long game of history, demanding imagination, dexterity and persistence.

oxo1 XF seizes alienation as an impetus to generate new worlds. We are all alienated – but have we ever been otherwise? It is through, and not despite, our alienated condition that we can free ourselves from the muck of immediacy. Freedom is not a given—and it’s certainly not given by anything ‘natural’. The construction of freedom involves not less but more alienation; alienation is the labour of freedom’s construction. Nothing should be accepted as fixed, permanent, or ‘given’—neither material conditions nor social forms. XF mutates, navigates and probes every horizon. Anyone who’s been deemed ‘unnatural’ in the face of reigning biological norms, anyone who’s experienced injustices wrought in the name of natural order, will realize that the glorification of ‘nature’ has nothing to offer us—the queer and trans among us, the differently-abled, as well as those who have suffered discrimination due to pregnancy or duties connected to child-rearing. XF is vehemently anti-naturalist. Essentialist naturalism reeks of theology—the sooner it is exorcised, the better.

oxo2 Why is there so little explicit, organized effort to repurpose technologies for progressive gender political ends? XF seeks to strategically deploy existing technologies to re-engineer the world. Serious risks are built into these tools; they are prone to imbalance, abuse, and exploitation of the weak. Rather than pretending to risk nothing, XF advocates the necessary assembly of techno-political interfaces responsive to these risks. Technology isn’t inherently progressive. Its uses are fused with culture in a positive feedback loop that makes linear sequencing, prediction, and absolute caution impossible. Technoscientific innovation must be linked to a collective theoretical and political thinking in which women, queers, and the gender non-conforming play an unparalleled role.

oxo3 The real emancipatory potential of technology remains unrealized. Fed by the market, its rapid growth is offset by bloat, and elegant innovation is surrendered to the buyer, whose stagnant world it decorates. Beyond the noisy clutter of commodified craft, the ultimate task lies in engineering technologies to combat unequal access to reproductive and pharmacological tools, environmental cataclysm, economic instability, as well as dangerous forms of unpaid/underpaid labour. Gender inequality still characterizes the fields in which our technologies are conceived, built, and legislated for, while female workers in electronics (to name just one industry) perform some of the worst paid, monotonous and debilitating labour. Such injustice demands structural, machinic and ideological correction.

ox04 Xenofeminism is a rationalism. To claim that reason or rationality is ‘by nature’ a patriarchal enterprise is to concede defeat. It is true that the canonical ‘history of thought’ is dominated by men, and it is male hands we see throttling existing institutions of science and technology. But this is precisely why *feminism must be a rationalism*—because of this miserable imbalance, and not despite it. There is no ‘feminine’ rationality, nor is there a ‘masculine’ one. Science is not an expression but a suspension of gender. If today it is dominated by masculine egos, then it is at odds with itself— and this contradiction can be leveraged. Reason, like information, wants to be free, and patriarchy cannot give it freedom. *Rationalism must itself be a feminism*. XF marks the point where these claims intersect in a two-way dependency. It names reason as an engine of feminist emancipation, and declares the right of everyone to speak as no one in particular.

## INTERRUPT

ox05 The excess of modesty in feminist agendas of recent decades is not proportionate to the monstrous complexity of our reality, a reality cross-hatched with fibre-optic cables, radio and microwaves, oil and gas pipelines, aerial and shipping routes, and the unrelenting, simultaneous execution of millions of communication protocols with every passing millisecond. Systematic thinking and structural analysis have largely fallen by the wayside in favour of admirable, but insufficient struggles, bound to fixed localities and fragmented insurrections. Whilst capitalism is understood as a complex and ever-expanding totality, many would-be emancipatory anti-capitalist projects remain profoundly fearful of transitioning to the universal, resisting big-picture speculative politics by condemning them as necessarily oppressive vectors. Such a false guarantee treats universals as absolute, generating a debilitating disjuncture between the thing we seek to depose and the strategies we advance to depose it.

ox06 Global complexity opens us to urgent cognitive and ethical demands. These are Promethean responsibilities that cannot pass unaddressed. Much of twenty-first century feminism—from the remnants of postmodern identity politics to large swathes of contemporary ecofeminism—struggles to adequately address these challenges in a manner capable of producing substantial and enduring change. Xenofeminism endeavours to face up to these obligations as collective agents capable of transitioning between multiple levels of political, material and conceptual organization.

oxo7 We are adamantly synthetic, unsatisfied by analysis alone. XF urges constructive oscillation between description and prescription to mobilize the recursive potential of contemporary technologies upon gender, sexuality and disparities of power. Given that there are a range of gendered challenges specifically relating to life in a digital age—from sexual harassment via social media, to doxxing, privacy, and the protection of online images—the situation requires a feminism at ease with computation. Today, it is imperative that we develop an ideological infrastructure that both supports and facilitates feminist interventions within connective, networked elements of the contemporary world. Xenofeminism is about more than digital self-defence and freedom from patriarchal networks. We want to cultivate the exercise of positive freedom—freedom-to rather than simply freedom-from—and urge feminists to equip themselves with the skills to redeploy existing technologies and invent novel cognitive and material tools in the service of common ends.

oxo8 The radical opportunities afforded by developing (and alienating) forms of technological mediation should no longer be put to use in the exclusive interests of capital, which, by design, only benefits the few. There are incessantly proliferating tools to be annexed, and although no one can claim their comprehensive accessibility, digital tools have never been more widely available or more sensitive to appropriation than they are today. This is not an elision of the fact that a large amount of the world's poor is adversely affected by the expanding technological industry (from factory workers labouring under abominable conditions to the Ghanaian villages that have become a repository for the e-waste of the global powers) but an explicit acknowledgement of these conditions as a target for elimination. Just as the invention of the stock market was also the invention of the crash, Xenofeminism knows that technological innovation must equally anticipate its systemic condition responsively.

## TRAP

oxo9 XF rejects illusion and melancholy as political inhibitors. Illusion, as the blind presumption that the weak can prevail over the strong with no strategic coordination, leads to unfulfilled promises and unmarshalled drives. This is a politics that, in wanting so much, ends up building so little. Without the labour of large-scale, collective social organisation, declaring one's desire for global change is nothing more than wishful thinking. On the other hand, melancholy—so endemic to the left—teaches us that emancipation is an extinct species to be wept over and that blips of negation are the best we can hope for. At its worst, such an attitude generates nothing but political lassitude,

and at its best, installs an atmosphere of pervasive despair which too often degenerates into factionalism and petty moralizing. The malady of melancholia only compounds political inertia, and—under the guise of being realistic—relinquishes all hope of calibrating the world otherwise. It is against such maladies that XF inoculates.

oxoA We take politics that exclusively valorize the local in the guise of subverting currents of global abstraction, to be insufficient. To secede from or dis-avow capitalist machinery will not make it disappear. Likewise, suggestions to pull the lever on the emergency brake of embedded velocities, the call to slow down and scale back, is a possibility available only to the few—a violent particularity of exclusivity—ultimately entailing catastrophe for the many. Refusing to think beyond the microcommunity, to foster connections between fractured insurgencies, to consider how emancipatory tactics can be scaled up for universal implementation, is to remain satisfied with temporary and defensive gestures. XF is an affirmative creature on the offensive, fiercely insisting on the possibility of large-scale social change for all of our alien kin.

oxoB A sense of the world's volatility and artificiality seems to have faded from contemporary queer and feminist politics, in favour of a plural but static constellation of gender identities, in whose bleak light equations of the good and the natural are stubbornly restored. While having (perhaps) admirably expanded thresholds of 'tolerance', too often we are told to seek solace in unfreedom, staking claims on being 'born' this way, as if offering an excuse with nature's blessing. All the while, the heteronormative centre chugs on. XF challenges this centrifugal referent, knowing full well that sex and gender are exemplary of the fulcrum between norm and fact, between freedom and compulsion. To tilt the fulcrum in the direction of nature is a defensive concession at best, and a retreat from what makes trans and queer politics more than just a lobby: that it is an arduous assertion of freedom against an order that seemed immutable. Like every myth of the given, a stable foundation is fabulated for a real world of chaos, violence, and doubt. The 'given' is sequestered into the private realm as a certainty, whilst retreating on fronts of public consequences. When the possibility of transition became real and known, the tomb under Nature's shrine cracked, and new histories—bristling with futures—escaped the old order of 'sex'. The disciplinary grid of gender is in no small part an attempt to mend that shattered foundation, and tame the lives that escaped it. The time has now come to tear down this shrine entirely, and not bow down before it in a piteous apology for what little autonomy has been won.

oxoC If ‘cyberspace’ once offered the promise of escaping the strictures of essentialist identity categories, the climate of contemporary social media has swung forcefully in the other direction, and has become a theatre where these prostrations to identity are performed. With these curatorial practices come puritanical rituals of moral maintenance, and these stages are too often overrun with the disavowed pleasures of accusation, sham- ing, and denunciation. Valuable platforms for connection, organization, and skill-sharing become clogged with obstacles to productive debate positioned as if they are debate. These puritanical politics of shame—which fetishize oppression as if it were a blessing, and cloud the waters in moralistic frenzies—leave us cold. We want neither clean hands nor beautiful souls, neither virtue nor terror. We want superior forms of corruption.

oxoD What this shows is that the task of engineering platforms for social emancipation and organization cannot ignore the cultural and semiotic mutations these platforms afford. What requires reengineering are the memetic parasites arousing and coordinating behaviours in ways occluded by their hosts’ self-image; failing this, memes like ‘anonymity’, ‘ethics’, ‘social justice’ and ‘privilege-checking’ host social dynamisms at odds with the often-commendable intentions with which they’re taken up. The task of collective self-mastery requires a hyperstitional manipulation of desire’s puppet-strings, and deployment of semiotic operators over a terrain of highly networked cultural systems. The will will always be corrupted by the memes in which it traffics, but nothing prevents us from instrumentalizing this fact, and calibrating it in view of the ends it desires.

## PARITY

oxoE Xenofeminism is gender-abolitionist. ‘Gender abolitionism’ is not code for the eradication of what are currently considered ‘gendered’ traits from the human population. Under patriarchy, such a project could only spell disaster—the notion of what is ‘gendered’ sticks disproportionately to the feminine. But even if this balance were redressed, we have no interest in seeing the sexuete diversity of the world reduced. Let a hundred sexes bloom! ‘Gender abolitionism’ is shorthand for the ambition to construct a society where traits currently assembled under the rubric of gender, no longer furnish a grid for the asymmetric operation of power. ‘Race abolitionism’ expands into a similar formula—that the struggle must continue until currently racialized characteristics are no more a basis of discrimination than than the color of one’s eyes. Ultimately, every emancipatory abolitionism must incline towards the horizon of class abolitionism, since

it is in capitalism where we encounter oppression in its transparent, denaturalized form: you're not exploited or oppressed because you are a wage labourer or poor; you are a labourer or poor because you are exploited.

oxoF Xenofeminism understands that the viability of emancipatory abolitionist projects—the abolition of class, gender, and race—hinges on a profound reworking of the universal. The universal must be grasped as generic, which is to say, intersectional. Intersectionality is not the morcellation of collectives into a static fuzzi of cross-referenced identities, but a political orientation that slices through every particular, refusing the crass pigeon-holing of bodies. This is not a universal that can be imposed from above, but built from the bottom up – or, better, laterally, opening new lines of transit across an uneven landscape. This non-absolute, generic universality must guard against the facile tendency of conflation with bloated, un-marked particulars—namely Eurocentric universalism—whereby the male is mistaken for the sexless, the white for raceless, the cis for the real, and so on. Absent such a universal, the abolition of class will remain a bourgeois fantasy, the abolition of race will remain a tacit white-supremacism, and the abolition of gender will remain a thinly veiled misogyny, even—especially—when prosecuted by avowed feminists themselves. (The absurd and reckless spectacle of so many self-proclaimed ‘gender abolitionists’ campaign against trans women is proof enough of this).

oxio From the postmoderns, we have learnt to burn the facades of the false universal and dispel such confusions; from the moderns, we have learnt to sift new universals from the ashes of the false. Xenofeminism seeks to construct a coalitional politics, a politics without the infection of purity. Wielding the universal requires thoughtful qualification and precise self-reflection so as to become a ready-to-hand tool for multiple political bodies and something that can be appropriated against the numerous oppressions that transect with gender and sexuality. The universal is no blueprint, and rather than dictate its uses in advance, we propose XF as a platform. The very process of construction is therefore understood to be a negentropic, iterative, and continual refashioning. Xenofeminism seeks to be a mutable architecture that, like open source software, remains available for perpetual modification and enhancement following the navigational impulse of militant ethical reasoning. Open, however, does not mean undirected. The most durable systems in the world owe their stability to the way they train order to emerge as an ‘invisible hand’ from apparent spontaneity; or exploit the inertia of investment and sedimentation. We should not hesitate to learn from our

adversaries or the successes and failures of history. With this in mind, XF seeks ways to seed an order that is equitable and just, injecting it into the geometry of freedoms these platforms afford.

## ADJUST

ox11 Our lot is cast with technoscience, where nothing is so sacred that it cannot be reengineered and transformed so as to widen our aperture of freedom, extending to gender and the human. To say that nothing is sacred, that nothing is transcendent or protected from the will to know, to tinker and to hack, is to say that nothing is supernatural. ‘Nature’— understood here, as the unbounded arena of science—is all there is. And so, in tearing down melancholy and illusion; the unambitious and the non-scaleable; the libidinized puritanism of certain online cultures, and Nature as an un-remakeable given, we find that our normative anti-naturalism has pushed us towards an unflinching ontological naturalism. There is nothing, we claim, that cannot be studied scientifically and manipulated technologically.

ox12 This does not mean that the distinction between the ontological and the normative, between fact and value, is simply cut and dried. The vectors of normative anti-naturalism and ontological naturalism span many ambivalent battlefields. The project of untangling what ought to be from what is, of dissociating freedom from fact, will from knowledge, is, indeed, an infinite task. There are many lacunae where desire confronts us with the brutality of fact, where beauty is indissociable from truth. Poetry, sex, technology and pain are incandescent with this tension we have traced. But give up on the task of revision, release the reins and slacken that tension, and these filaments instantly dim.

## CARRY

ox13 The potential of early, text-based internet culture for countering repressive gender regimes, generating solidarity among marginalised groups, and creating new spaces for experimentation that ignited cyberfeminism in the nineties has clearly waned in the twenty-first century. The dominance of the visual in today’s online interfaces has reinstated familiar modes of identity policing, power relations and gender norms in self-representation. But this does not mean that cyberfeminist sensibilities belong to the past. Sorting the subversive possibilities from the oppressive ones latent in today’s web requires a feminism sensitive to the insidious return of old power structures, yet savvy enough to know how to exploit the potential. Digital technologies are not separable from the material realities that underwrite them; they are connected so that each can be used

to alter the other towards different ends. Rather than arguing for the primacy of the virtual over the material, or the material over the virtual, xenofeminism grasps points of power and powerlessness in both, to unfold this knowledge as effective interventions in our jointly composed reality.

oxi4 Intervention in more obviously material hegemonies is just as crucial as intervention in digital and cultural ones. Changes to the built environment harbour some of the most significant possibilities in the reconfiguration of the horizons of women and queers. As the embodiment of ideological constellations, the production of space and the decisions we make for its organization are ultimately articulations about ‘us’ and reciprocally, how a ‘we’ can be articulated. With the potential to foreclose, restrict, or open up future social conditions, xenofeminists must become attuned to the language of architecture as a vocabulary for collective choreo-graphy—the coordinated writing of space.

oxi5 From the street to the home, domestic space too must not escape our tentacles. So profoundly ingrained, domestic space has been deemed impossible to disembed, where the home as norm has been conflated with home as fact, as an un-remakeable given. Stultifying ‘domestic realism’ has no home on our horizon. Let us set sights on augmented homes of shared laboratories, of communal media and technical facilities. The home is ripe for spatial transformation as an integral component in any process of feminist futurity. But this cannot stop at the garden gates. We see too well that reinventions of family structure and domestic life are currently only possible at the cost of either withdrawing from the economic sphere—the way of the commune—or bearing its burdens manyfold—the way of the single parent. If we want to break the inertia that has kept the moribund figure of the nuclear family unit in place, which has stubbornly worked to isolate women from the public sphere, and men from the lives of their children, while penalizing those who stray from it, we must overhaul the material infrastructure and break the economic cycles that lock it in place. The task before us is twofold, and our vision necessarily stereoscopic: we must engineer an economy that liberates reproductive labour and family life, while building models of familiarity free from the deadening grind of wage labour.

oxi6 From the home to the body, the articulation of a proactive politics for biotechnical intervention and hormones presses. Hormones hack into gender systems possessing political scope extending beyond the aesthetic calibration of individual bodies. Thought structurally, the distribution of hormones—who or what this distribution prioritizes or pathologizes—is of paramount import. The rise of the internet and the hydra of black

market pharmacies it let loose—together with a publicly accessible archive of endocrinological knowhow—was instrumental in wresting control of the hormonal economy away from ‘gatekeeping’ institutions seeking to mitigate threats to established distributions of the sexual. To trade in the rule of bureaucrats for the market is, however, not a victory in itself. These tides need to rise higher. We ask whether the idiom of ‘gender hacking’ is extensible into a long-range strategy, a strategy for wetware akin to what hacker culture has already done for software—constructing an entire universe of free and open source platforms that is the closest thing to a practicable communism many of us have ever seen. Without the foolhardy endangerment of lives, can we stitch together the embryonic promises held before us by pharmaceutical 3D printing (‘Reactionware’), grassroots telemedical abortion clinics, gender hacktivist and DIY-HRT forums, and so on, to assemble a platform for free and open source medicine?

oxi7 From the global to the local, from the cloud to our bodies, xenofeminism avows the responsibility in constructing new institutions of technomaterialist hegemonic proportions. Like engineers who must conceive of a total structure as well as the molecular parts from which it is constructed, XF emphasises the importance of the mesopolitical sphere against the limited effectiveness of local gestures, creation of autonomous zones, and sheer horizontalism, just as it stands against transcendent, or top-down impositions of values and norms. The mesopolitical arena of xenofeminism’s universalist ambitions comprehends itself as a mobile and intricate network of transits between these polarities. As pragmatists, we invite contamination as a mutational driver between such frontiers.

## OVERFLOW

oxi8 XF asserts that adapting our behaviour for an era of Promethean complexity is a labour requiring patience, but a ferocious patience at odds with ‘waiting’. Calibrating a political hegemony or insurgent memplex not only implies the creation of material infra-structures to make the values it articulates explicit, but places demands on us as subjects. How are we to become hosts of this new world? How do we build a better semiotic parasite—one that arouses the desires we want to desire, that orchestrates not an autophagic orgy of indignity or rage, but an emancipatory and egalitarian community buttressed by new forms of unselfish solidarity and collective self-mastery?

oxi9 Is xenofeminism a programme? Not if this means anything so crude as a recipe, or a single-purpose tool by which a determinate problem is solved. We prefer to think like the schemer or lisper, who seeks to construct a new language in which the problem at hand

is immersed, so that solutions for it, and for any number of related problems, might unfurl with ease. Xenofeminism is a platform, an incipient ambition to construct a new language for sexual politics—a language that seizes its own methods as materials to be reworked, and incrementally bootstraps itself into existence. We understand that the problems we face are systemic and interlocking, and that any chance of global success depends on infecting myriad skills and contexts with the logic of XF. Ours is a transformation of seeping, directed subsumption rather than rapid overthrow; it is a transformation of deliberate construction, seeking to submerge the white-supremacist capitalist patriarchy in a sea of procedures that soften its shell and dismantle its defenses, so as to build a new world from the scraps.

OXIA Xenofeminism indexes the desire to construct an alien future with a triumphant X on a mobile map. This X does not mark a destination. It is the insertion of a topological-keyframe for the formation of a new logic. In affirming a future untethered to the repetition of the present, we militate for ampliative capacities, for spaces of freedom with a richer geometry than the aisle, the assembly line, and the feed. We need new affordances of perception and action unblinkered by naturalised identities. In the name of feminism, 'Nature' shall no longer be a refuge of injustice, or a basis for any political justification whatsoever!

If nature is unjust, change nature!

The Xenofeminist Manifesto was first published online by Laboria Cuboniks in 2015. The original version can be found here. (<http://www.laboriacuboniks.net/>)

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Laboria Cuboniks (b. 2014) is a xenofeminist collective, spread across five countries and three continents.

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JOURNAL > SITE 0: CASTALIA, THE GAME OF ENDS AND MEANS | 2016

## Culture Without Mirrors—Restructuring Creative-Cognitive Power

Amanda Beech

A means by which a critical culture defines itself as such is for its art, architecture and artifacts to picture the human as a subject of history. This is to say that buildings, forms, images and experiences posit critique as a manifestation of self-consciousness where shapes, forms, and sounds articulate an explicit understanding and explanation of the forces that dominate the relations and values of society and the place of the human that is produced through them and by them.<sup>1</sup> This mode of explanatory aesthetics identifies culture as an illuminating mirror of a human identity that is captured within and alienated by systems of its own making. But it also *brings about* a particular aesthetics of alienation. In short, this means that culture has indoctrinated the concept that subjectivity is a product of forces that are beyond any decisive power that might override them or change them, and furthermore, that recognizing this dilemma is *the normative impulse to change* that conditions our aspiration to seek autonomy from it, the result of which can only underscore law as habit. Within this bind of a pre-political nominalism—a subject crafted before itself—the figure of the self becomes the mark of the impossibility to determine ourselves as *anything otherwise*. However, this thesis of constraint embeds a central contradiction where at the root of this humility is a remarkable persistence with the utopian fantasy that believes that the cultural exposition of contingent material in the public realm (this *being subject to* the unnatural laws of instrumental reason), results in achieving a status of a heteronomous nature as lived.<sup>2</sup> Here this culture as a form of consciousness obtains a transcendental

force, where consciousness provides access to a miasmatic participation with the nature of power as nature. So, it goes, culture can disconnect itself from instrumentalism to access a form of being—a free nature—through its self-realization *as culture*.

The subjectivity that is the consequence of this logic becomes the primary location and site for critique. It incorporates time and space, collapsing the subject and historical time as one manifest identity that presumes an essential specificity. As an obstructive mechanism or at best, a means of response by the understanding to what we might term the spontaneous history of an instrumental reason, our culture becomes the mirror of a self-relation to the nature of critique itself. In this identarian reflexive consciousness, culture manifests the multidimensional fabric of the city, the museum, interest groups and the home; it constitutes the communities that we inhabit and tells us that the present is all we have, since planning for longer term outcomes is not only impossible but morally suspicious. In these terms we are destined to the mythology of knowing self as the only exemplification of rational thought, and its aesthetic manifestation is not merely our extension but our replication of our desire to articulate the limits and the borders of reason. Read as a product of unnatural inorganic forces (this predilection to cause), the painful and tragic dilemma of subjectivity remains a strong fiction for culture to deride and to love—a problem to engross ourselves within and through which we can say that we have examined, interrogated and worked through the conditions that organize life.

In light of the destitution of cultural horizons, we must question the ways in which culture has embedded its comprehension of critique as an incorrect and unworkable form of metaphysics that had led itself to believe that it was operating under the rubric of a coherent materialism that sustained itself at the level of sensory materiality. This rejection of culture as a rational and representational operation demands work, for it is here where we must question the aspirations and methods for another comprehension of reason: a nontraditional metaphysics without traditional representationalism—that is, a culture without mirrors.

### Questions

How can reason operate without returning us to the paradigm of a tragic self-consciousness that to all extents contains the contradictory facets of: a) the duality of reason and percept that generate a crisis state of introspection and ineffability; and b) the vitalization of the human as a form of pre-political nature that rejects forms of autonomy that produce change? Can such a consciousness be extrapolated without

projecting a Rortyan-style private irony of a classic liberal posture that pays lip service to a decentered subjectivity, heralds culture as the primary mode of affecting change (a form of transposing culture to the role of science), and without any consequence to the prevailing systems of capitalist distribution for both?<sup>3</sup> When self-preservation produces self-destruction, can skepticism be given a project beyond its own certitude, that is, without idealizing the space of indeterminacy (known unknowns) as the primary expression of knowledge?

## Conclusions

### The Myth of the Human

The figure of the human subject and its destruction is our central distraction, occupying and determining the space of what is falsely claimed as critical culture. Rejecting concepts of the powerful individual agent that capital has provided us in favor of a weak or impoverished image of the human does nothing to support political or cultural critique. The aspirations for a radical ‘ungrounding’ of the subject vis-à-vis its sublimation through capital leaves us with only dismal outcomes: i) the projection of process as the ultimate reification of figure as duration; ii) the subject in a form of Judeo-Christian struggle whose determination to process as a thing in itself demarcates only an ethos of difference that is essentially content-free; and/or iii) the subject who assumes that the dismantling of subjectivity constitutes some real loss, since it can only be expressed as limits, finitude or another such dimension of the tragic. The strong body of ideology is replaced by the weak and yet sustainable body of *ideology critique*—one mythology versus another.

### The Social Realist Sublime and the Scientific Sublime

A result of this attempt to disengage representational work from culture ultimately results in a private expression of finitude that affiliates the image with the nonexplanatory and/or irrational. This perspective of cultural production holds and promotes doubt as a critical practice, and uncertainty and instability as the real of the image as well as the enterprise of political art. Here, we see the image taking place as a specifically general representational experience—as both spectacle and nature—a form of a redundant Kantian sublime where power is massive and disinterested: a form of capitalist social realism. Pitching the operations of one form of consciousness in direct correlative duality with another—such as free imagination versus standard mythology, or direct communication versus illusory images—only determines the site of critique that

dissects these as an uncritical fundamentalist subjective expression. In our paradigmatic examples of contemporary critical method, which span Kantian inspired reflection, phenomenology and affect, and scientific materialism, representations are consistently identified as a field that rationality cannot penetrate, only manage. A critique of representation is a means to access both the real of sensation and the objectivity of reason. In many senses the consciousness that is required for this critique is just not conscious *enough*. How images produce facts and make up rationally organized systems is crucial to our investigations.

### The Negative Space of the Image

A valorization of the interpretative subjective reading of images is harnessed through the mystery of the image *per se*, or the experiential irresolution of meaning evidenced over time, which demonstrates the pliability of language in duration. The image now facilitates infinite encounters, possibilities and responses because all referents are unavailable as standard anchorages for meaning. We encounter these approaches across the different critical methods of negative dialectics, territories of perception, and in post-structuralism and post-deconstruction where the image is idealized through its infinite potentiality. The potentiality of the image is purchased through the discursive and the processional, only to be secured as the site that opposes these elements in abstract unification of the image as a form of ‘oneness.’ In other words, by opposing ‘concept’ by means of the infinitude of discursive processes, the image returns to the space of the sensory which instigates a cultic form of authenticity.<sup>4</sup> Accessing what we might imagine to be pure abstraction in art paradoxically becomes the ultimate reification of the oxymoronic figure as duration.

### Failure to Act – Naturalized Skepticism

A comprehension of the image as essentially groundless and always already unstable in fact has a purpose and direction, especially when this theory is identified as the hallmark of a critical cultural practice. What is claimed as a defensible observation of the ‘noninstrumental’ or heteronomous nature of the image is in fact an unsubstantiated myth and ultimately a tool that moves from a theory of nature to a theory of the political. The agency of the image as nature in flux, in all its random and contingent identities is now at the service of various projects of democracy, equality, difference, and liberation in its work to undo and unravel all forms of stability in the political towards forms of disequilibrium. Problematically, because the idea of the image itself is assumed to be

adequate to nature, it is incapable of understanding the systems of force that organize its own construction, as a theory. This theory of the image as endowed with the spirit of the political and the body of the real is contradictory because it fails to recognize these notions of disequilibrium as 'goal' and as 'object' (or principle) as distinct categories. In short, although the theory of the image as nature occupies some unbridled, unregulated form that understands the image as 'real,' what is ultimately generated is another deeper skepticism of the image. This is because the image is asked to operate ironically as both nature and tool whilst neither can be accessed as such. This results in a failure to comprehend the condition of reality as well as the condition of a realist politics that might propose its adequation to this. This dualism of the image proliferates new forms of doubt that emerge from the conviction to refuse critical consciousness. A new critical negativity is universalized to the principle of skepticism, where a self-conscious critique is reestablished in dualisms that spring from pluralist hopes. These are unworkable for the project of real criticism.

### Project

It is important for us to extrapolate a distinction between the methodological paradigms of scientific knowledge and self-conscious knowledge (whether this is purchased purposively or naively) in order to organize a cultural practice that does not avoid a cognitive understanding of the conditions in which it finds itself, but crucially, also refuses to situate these as a negatively charged real-ideal identarian foundation by which to oppose and anchor a *different future*. The ideological character of a theory of cause, subject and historical consciousness has been classified as tethered to the forces of preconception and intuition, theology, belief, and perception. Reason has also been understood as the pervasive force of a dominant power that leads to the horrors of absolute mastery. As we have seen, the logic of escaping these assumed systems of dominance that are proposed in schemas of either unconsciousness (sensory, affect-based) or what I have termed self-conscious practices, results in underscoring a form of critique that continues to vouch for the myths of mastery and transcendence endemic to this description of reason, since therein exists the erroneous belief that we are free to choose or reject consciousness.

We can say then that consciousness and self-transformation are necessary to a shift in the political, since we require a shift in the standard conception of critical method and cause.<sup>5</sup>Inhabiting this as a commitment then becomes a question of how one might act according to this rationale. A simplistic denial of the systems of authorship, or to deny

authorship as individuation in favor of a collaborative interdisciplinarity, is a weak semantic approach to this problem.<sup>6</sup> Furthermore, the persistence of extending the ego towards objects does little to rethink the very format of consciousness and how culture might cease to exist as a mirror of this paradigmatic individual. When our conscious life is produced across the terrain of images, we need to propose a role for images that is coherent with this reality and which projects reality as a model that includes us, but cannot be about us.<sup>7</sup>

The question here concretely addresses how such thinking is capable of reorganizing not just the products of culture but the productive relations of society and culture together. This work requires consensus building and action towards a new universalism. This is to produce culture that is rigorously engaged in the conditions of these deeper realities. A politics that manifests the ‘as if’ is a culture that acts in accordance with the real of reality as a form of realism. It must determine the ‘as if’ to be *the case* and not the fictive thought of the ‘what if?’ We must be careful to occupy the grounds that demand correctness, rather than appeal to the folklore of a capitalist framework, one that as we have seen is the drug of familiarity, satisfaction and comfort dressed in the appealing moral garb of the crisis of negativity. To refute the conditions of a regime we require new proofs, but to transform the productive relations of a culture that serves capital in order to transform the system itself, requires not a general address to the image itself as the problem, but instead the operation of the image as factual weapon, one which can be deployed in carefully chosen battles.

A culture without mirrors—a culture that is not a reflection and therefore has no concept of a specifically *human nature* as its grounds—is the possibility to think representation without an investment in subject or cause. It might also predict the fear of a culture without empathy, solidarity and community, for how can we understand each other without this mode of identification? Would this risk a form of radical individualism and destroy the forms of collective consciousness that have been hitherto required for change?<sup>8</sup> This is a false anxiety since this fear fails to understand that images are not constituent parts of the human. Whilst we are images, images are not us and knowing this is not the formulation of some crisis.

We have been careful to distinguish this new culture from a culture without mirrors. But this different culture produces living operational models that figure the horizon for a culture as necessary, and which inscribe a reality that is performed within but cannot be accommodated by the prevailing principles of neoliberal power. The necessity and

urgency of understanding how rationalist and creative practices operate at the level of representation *and cognition* then is key: This is a question of how culture can present and inhabit reason.

We have outlined the requirement to dismantle the idealism that supports a universal notion that conditions the nonexplanatory identity of culture to a politics, and to refuse the normative representation of negativity as an object that holds a *democracy to come*. What is also clear is that a culture that self-consciously discloses, exhibits or analyses this nonexplanatory aspect of itself assumes a form of transcendental knowledge that further establishes culture as a form of eccentric work that fantasizes about its political power from the realms of bourgeois interior decoration.

The task for culture then is to comprehend the role of consciousness again, correctly, and, by doing so, to recast the operation of its representations. A culture that is critical, or skeptical, of the circumstances in which it finds itself should not be involved in the legacy of Cartesian paranoia of the kind we have been discussing here. Rather, this must be a culture with rule—one that ultimately disposes of myths that have already been proven as incorrect. To behave according to this other rule is now the task of a culture that rigorously *reflects without mirrors*. A culture as a projection machine that makes worlds that are not of the order of the pejorative-fictive (left to the alterity of the imagination), but a culture of a rational imaginary as an insinuation of proofs, ready for conjecture; casting off the DNA of self-doubt towards an operation that is grounded in a new epistemology, one that requires a rigorous consciousness, but with no anticipation of its limits.

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## Footnotes

1. We can cite neo-liberal capitalism as the figure of such power, but tied to this is the correlative relation between reason and cause.
2. Consider Hermann Hesse's novel *Steppenwolf* (1927) where a similar delirium of a cultic modernist subjectivity is accessed as a product of the social constraints that he faces.
3. We see this in the claims to the space of culture as the 'open.' The image combines the *never and forever* of production and refusal, of writing and difference. Images are innately negative: they are gatekeepers of the 'open' and take center-stage in catalyzing the political claims for culture as becoming. In Giorgio Agamben's essay "What is the Contemporary?," he writes of the operations of culture as something that sees beyond the conditions of the *visible given* to the darkness that is yet to be light. This anticipation from the contemporary producer of culture reads as a form of Nietzschean modernity where the artist resides in a time that is "out of joint." The resulting projection is a figure of a typically transcendent nature, and a place where politics happens

culturally by dint of its ability to escape the strictures of the given by not recognizing them as such. This is a description of the nature of the image and the task of the artist to realize this nature. Chantal Mouffe's theory of 'agonism' as a condition that acts as the defining framework for a radical democracy also rests upon a theory of negativity, where agonism guarantees the ungrounded nature of political action in processes of disagreement at the level of relational affirmations of communal identity differentials. These operations of difference are centered in a politics of recognition, where difference is recognized and tolerated as such. However, to build a political project upon this dialectic of negativity is naive and contradictory, because whilst we can say that we do not have adequate explanatory reasons for perception, this does not mean that this will always be the case. And, whilst we cannot rationalize images in any concrete sense, this does not mean that we cannot understand their operative function in context-based systems.

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5. See Reza Negarastani. "The Labor of the Inhuman, Part 1: Human." *E-flux journal*, 52 (February 2014). Web.

6. In *Philosophy and the Spontaneous Philosophy of the Scientists*, Althusser denigrates the culture of interdisciplinarity as an insidious ideological force: "...interdisciplinarity is usually the slogan and the practice of the spontaneous ideology of specialists: oscillating between a vague spiritualism and technocratic positivism" (97). Luis Althusser. *Philosophy and the Spontaneous Philosophy of the Scientists*. London: Verso, Radical Thinkers series, 2012. 320. Print.

7. See Thomas Metzinger. *The Ego Tunnel: The Science of the Mind and the Myth of the Self*. New York: Basic Books, 2010. 234. Here, he identifies a future of avatar-to-avatar communications and autonomous self-managing brain design brought about through the expansive technological form of the ego tunnel in cyberspace. As image consciousness is transformed in technological mechanisms, so must we transform the projection of the human that generates life in an enlarged and unprecedented manner. How this modificatory paradigm enables some shift from the Kantian

notion of autonomy is the issue in this case since the question of what we desire to be is crucial—what Metzinger refers to as “consciousness ethics.”

8. As we have seen, such universalisms have been proposed in the discourse on the sublime, where in order to think the political, a private self-consciousness is grafted upon forms of public consensus and change, but ultimately this is incapable of guaranteeing any form of collective consciousness.

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